PEST CONTROL

MARCH
1955

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Every PCO delegate to university conferences knows lab sessions are warm, friendly, educational. That's the way to learn. Here Eastern conference chairman, David McAlindin (seated), proves he likes absorbing insect damage recognition pointers from U. of Mass. entomologists Dr. William B. Becker (left), and Dr. Frank R. Shaw (right), while their assistant, John A. Weidhaas, looks on. This issue brims over with the cold facts coming out of these meetings, but nothing substitutes for being on the campus to get the personal attention such experts freely give PCOs.

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Over and over again we hear PCOs complain of competitive price cutting. When you ask why operators chisel at each others bids, the reason most often given is that the low bidder is able to operate more economically, has his routes better organized, buys in larger quantities, etc. Is such reasoning wholly justified? We think not. Certainly those factors have some bearing, but they do not account for the wide variance in quotations submitted to prospects. Once the slicing process starts, it keeps on and on until it appears the most efficient operation is one with practically no expense at all.

"Methods are more important than the chemicals you use," Fish & Wildlife Washingtonman, Walter Dykstra, told operators at the Purdue conference. Manpower is the biggest expense. If you spread it too thin, the serviceman can hardly do more than take a quick run through each stop on his route. Is this "better route organization"?

Wage levels in various parts of the country vary with local conditions, but one competitor has to keep his employees' pay envelope much on a par with others in his immediate area. Since time is the highest cost factor, how can one firm halve another's going rate? Service to the customer must be sacrificed.

Preventive pest control is our strongest selling point. That means your men regularly have to carefully inspect each stop to determine in advance potential trouble spots. They should also be making recommendations for improvement in sanitation. There should be very little difference in the cost for this service between ABC Pest Control and XYZ Pest Control.

The justifications we hear for cutting prices emphasize an immediate need for standards which spell out the length of time it takes to perform specific jobs. If your customer understands how long it takes to give him proper service, and that you pay your men commensurate with their skill and ability and the existing wage rate, that customer will soon realize he gets what he pays for when he accepts a bid that is one-half what you are charging.

Create new business rather than take it away from a fellow operator. Everybody will eat better!

James A. Nelson

Editor

PEST CONTROL

EVERY MONTH SINCE 1933

JAMES A. NELSON
Editor

H. B. WILSON
Assistant Editor

R. J. HOFFER
Circulation Manager

KARL HASSLER
West Coast Representative

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letters

Reader's Aspirations

Now that the New Year is well on its way, perhaps it would be advantageous to take a look at some of the thoughts, aspirations and desires a number of pest control industry members have been having over the past few years.

Since we first became organized as an industry in 1933 when the NRA forced us to act as a unit, members have been expecting leaders in our field to contribute their time and monies for the advancement of the industry's welfare. Perhaps Bill Buettner set the pace when he so graciously worked for so many years without salary. If we are to expect talented persons to give their time to our needs, we must make it worthwhile for them to do so.

We have experienced a close liason with government bureaus as demonstrated by the outstanding work that Dr. Ralph Heal has done with the FHA and VA in protecting homes built under government financing. We trust this liason sets a pattern for what we hope will come in other phases of our general field.

There is a need, too, for more technical assistance on techniques, and on-the-job help. Various sections of our country have special problems which cannot be solved by general recommendations. This kind of service costs money, but I believe we would be willing to pay for it if it could be made available.

Perhaps an industry-wide check and research program could be organized using all members. Such a check would give us valuable records on the techniques employed, the problems experienced, and how they were solved. A quarterly or yearly summary of the findings could be issued.

Possibly our biggest need comes in the field of public relations. First of all a constant flow of member contact must be established. Then there must be regular appearances of qualified persons speaking before industry groups which can use our services. Equally as important is the need for a deluge of publicity material to newspapers, magazines, trade papers, radio and TV stations to keep the consumer aware of our services and of their beneficial aspects. Much of this material could well originate from and be supplied by our individual members.

Let's hope the coming year will see a resurgence of our national industry activity that will realize some of these objectives.

Herman C. Militzer

H & M Laboratories
Toledo, Ohio

English PCO Reports Wharf Borer British Problem, Too

The report by Mr. Charles Pomerantz on "The Way We Handled A Wharf Borer Infestation in a N. Y. Apartment Building," (PC, Oct., p 35) was of interest to us, since a similar infestation was treated in London last year.

Four ground floor apartments on one side of a building were infested every spring, and the source was difficult to locate. A pipe duct, packed with cork chips, ran beneath all the infested apartments, covered by a concrete floor upon which was laid parquet flooring. The infested wood was presumed to be rotten pieces of shuttering left in the duct when the concrete was poured many years previously.

To remove all the flooring and empty the duct was uneconomical, and holes were cut in the center of each room. Long spray nozzles were inserted, and the duct saturated with a 5% chlordane solution. The holes were closed with slabs fitted trapdoor fashion, with ventilator grid inserts.

In previous years thousands of adult beetles appeared every spring, but this year only ten emerged and died rapidly. The traps in this room were opened and chlordane re-applied.

Chlordane would therefore appear to be as effective as the Penta-Ortho solution used in New York.

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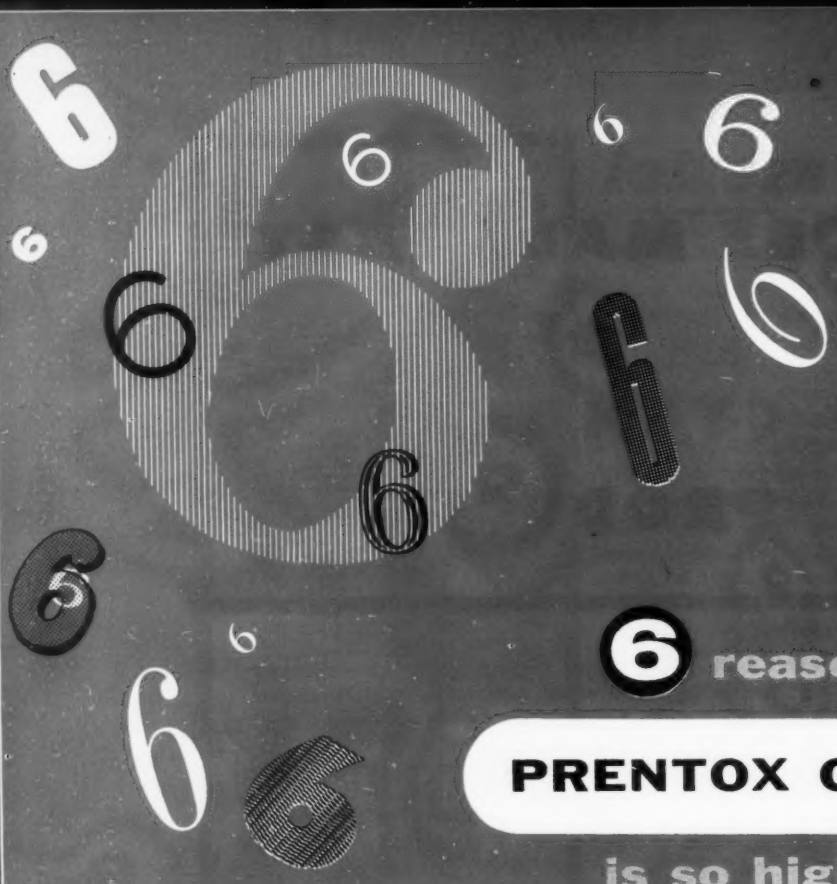

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1955

Report from the Communicable Disease Center

PUBLIC HEALTH PESTICIDES

For Mosquitoes, Flies, Fleas, Roaches, Bed Bugs and Rodents

From the Communicable Disease Center, Public Health Service, U. S. Department of Health, Education and Welfare, Savannah, Georgia, (Pictured at left), January 31, 1955

THIS SUMMARY of current information on the chemical control of pests of public health importance is based on investigations conducted by the Technology Branch, Communicable Disease Center, supplemented by a review of the work done by other research groups.[1] As many of the data relate to the geographic area involved in the study, the success of any specific control measure will in part depend upon its adaptability to local conditions. The widespread variation in the occurrence and level of arthropod resistance to chemicals in the world further adds to the difficulty of advocating measures which are effective on a generalized basis.

During 1954 one of the major advances in insect control was the increased use of organophosphorus compounds in fly and mosquito abatement. Part of this increase was due to the commercial production of organophosphorus compounds having relatively low mammalian toxicity hazards. In addition, improved methods for utilizing such compounds in insect control were developed. Despite such progress, the resistance of insects to chlorinated hydrocarbon insecticides still continued to be the most significant problem encountered in vector control.

As with previous resumes, this summary of technologic information emphasizes those chemicals which, under test conditions, have provided the highest level of control at minimum dosages and which are compatible with human safety. Such a summarization of the data precludes the detailed inclusion of all chemicals capable of producing suppressive effects upon the pests under consideration. In addition, experimental insecticides not available on a commercial basis are omitted from the discussion. Information on laboratory and field studies with these experimental compounds can be obtained by writing to Technical Development Laboratories, Communicable Disease Center, Box 769, Savannah, Georgia. In instances where the control measures for 1955 are the same as those for 1954, they have been restated verbatim.

In developing any control program it is important that the limitation of individual measures be recognized. The common tendency to expect a single method to provide the effective abatement of an arthropod frequently leads to the lack of interest in any technique which does not accomplish this overall purpose. This outlook is a definite handicap to the control operator. In many instances a measure not applicable on a general basis may serve effectively when employed on a selective criterion. The operator must recognize this factor and rely upon a variety of techniques alone or in combination to accomplish his objectives.

MOSQUITO CONTROL

Reports suggest the occurrence of resistance to DDT in eight species of *Anopheles* found in certain areas in Asia, Europe, and South America. To date, the principal vector of malaria in the United States, *Anopheles quadrimaculatus*, has not displayed any loss in susceptibility to DDT. Previous reports from the Tennessee Valley Authority indicated that a slight degree of resistance to DDT might possibly be developing in localities which have been under continuous treatment since 1947. However, the current findings are that the slight loss of effectiveness of DDT as a larvicide in field operations may be ascribed equally as well to factors other than resistance. Consequently the control procedures outlined for this species in previous years are applicable in 1955,

1. Acknowledgment is made particularly to the Entomology Research Branch, U. S. Department of Agriculture, for providing certain experimental data for inclusion in this resume.

namely the use of 5 per cent DDT-emulsion residual sprays in dwellings or a 5 per cent DDT oil solution for outdoor space treatments for control of adult mosquitoes.

Current data on the development of resistance in flies and mosquitoes indicate that the exposure of both larval and adult stages to chlorinated hydrocarbons may cause a more rapid development of resistance than does the exposure of a single stage. Consequently, larviciding for the control of *A. quadrimaculatus* should not be carried out except where this method is the only practicable means of abatement. When such treatment is advisable, effective control can be obtained either by hand spray application of 0.05 pound of DDT in 1 gallon of fuel oil per acre or by airplane application at the rate of 0.05 to 0.10 pound of DDT per acre, applied as a 20-per cent solution in methylated naphthalenes such as Velsicol NR-70 or Sovacide 544B. In general, DDT larvicides can be used effectively against various species of *Culex*, *Aedes*, and *Anopheles* unless resistant strains have developed. In areas where both larviciding and DDT residual spraying of homes are contemplated, consideration should be given to the possible use of organic phosphorus compounds (e. g. malathion) rather than the chlorinated hydrocarbons for the larviciding operations.

"Barrier strip spraying with DDT offers daytime relief from certain pest mosquitoes."

The only mosquito vector of disease in the United States which has manifested a high degree of resistance to DDT and other chlorinated hydrocarbons is *Culex tarsalis*. Excellent control of resistant larvae of *C. tarsalis* can be obtained by the ground dispersal of EPN at a rate of 0.035 pound per acre or malathion at 0.4 pound per acre. In numerous California abatement districts, EPN dispersed at rates of 0.035 pound per acre by ground equipment and 0.075 pound per acre by airplane has been used effectively against resistant *C. tarsalis* larvae. Under the supervision exercised by the California State Department of Public Health, there is no indication that such treatment has resulted in harmful effects to the operators or to the public. Because of its high toxic hazard to man, EPN should be handled with the same precautions as are employed for parathion. As a further safeguard, this chemical should not be used in urban areas.

Among the culicine species, resistance also has been detected in *Aedes sollicitans*, *Aedes taeniorhynchus*, *Aedes dorsalis*, *Aedes nigromaculis*, and *Psorophora confinnis*. Larvicides of EPN at the dosage levels outlined for control of *C. tarsalis* have proved effective against *A. nigromaculis*. Small scale field tests in Florida by the Entomology Research Branch, U. S. Department of Agriculture, indicate that effective kills of slightly to moderately DDT-resistant larvae of *A. sollicitans* and *A. taeniorhynchus* can be obtained with ground applied emulsions of EPN and parathion at 0.01 pound per acre; heptachlor and dieldrin at 0.025 pound per acre; and lindane, chlordane, and malathion at 0.05 pound per acre. In airplane treatments of 70-acre test plots, fuel oil solutions of EPN at 0.05 pound per acre gave almost complete control of salt marsh mosquito larvae. A similar level of control was secured with lindane, endrin, dieldrin, and heptachlor at 0.1 pound per acre. For airplane treatment of heavily vegetated salt marshes, the use of granular insecticides appears to be the most effective means of application. EPN, parathion, or heptachlor at 5 per cent concentrations on bentonite gave excellent reduction of salt marsh mosquito larvae when applied by airplane at a dosage of 0.05 pound of toxicant per acre. Since the salt marsh species are capable of developing resistance to the chlorinated hydrocarbons, the organic phosphorus compounds appear to be the most promising insecticides for their control.

For control of resistant adult salt marsh mosquitoes, lindane-fuel oil solutions applied by airplane at a rate of 0.1 pound of lindane per acre have given excellent control of *A. sollicitans* and *A. taeniorhynchus* which were highly resistant to DDT. Heptachlor was only slightly less effective at the same dosage. Dieldrin at 0.2 pound per acre also gave satisfactory control. With ground equipment BHC (2.5 per cent gamma) and heptachlor dispersed at respective rates of 0.04 and 0.07 pound of toxicant per acre provided excellent reduction of salt marsh mosquito annoyance.

Recent studies by the U. S. Department of Agriculture and California Department of Public Health on the control of adult *A. nigromaculis* by aerosol treatment revealed malathion to be more effective than BHC, DDT, or pyrethrum formulations in reducing annoyance by this species. Diesel oil formulations containing 5 per cent malathion produced a 92 to 100 per cent reduction in the mosquito landing rates of *A. nigromaculis* when dispersed at the rate of 12 gallons per linear mile. Landing rates were reduced to these levels for a distance of 200 yards from the machine.

"Treatment of privies for houseflies with dieldrin, chlordane, or BHC should be avoided."

In 1952-53, studies at Cleveland, Mississippi, demonstrated that preflood applications of

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dieldrin emulsions to rice fields at a rate of 1.0 pound of dieldrin per acre gave excellent control of *Psorophora* larvae for the entire season. Similar applications of dieldrin emulsions at dosages of 0.75 and 0.5 pound of dieldrin per acre were equally effective for periods of 7 to 8 weeks after initial flooding of the rice fields.

In 1954, a preflood application of dieldrin (0.5 pound per acre) to 3,000 acres of rice, representing the entire acreage within a 37 mile circumference, failed to give satisfactory control of *P. confinnis* larvae for the extended periods shown in previous years. Resistance tests with *P. confinnis* adults in the field demonstrated that specimens from the treated area were highly resistant to dieldrin residues. Small plot tests likewise showed survival of *Psorophora* larvae in plots freshly treated with dieldrin emulsion at a rate of 2 pounds of dieldrin per acre. Application of organophosphorus compounds to test plots and irrigated pastures indicated that these compounds are effective against the resistant mosquitoes.

In the United States in areas where resistance is not a factor, DDT still remains the insecticide of choice for space spray and residual treatments. In experimental studies at Savannah, Georgia, in 1953, excellent nighttime control of salt marsh mosquito adults was obtained at a drive-in theater by single fog applications of 1 gallon of 2.5 per cent DDT, 1.0 per cent chlordane, or a pyrethrum formulation containing 0.25 per cent pyrethrins and 2.0 per cent piperonyl butoxide, in a 1:1 fuel oil-kerosene solution. Application of the fog at or after dusk was essential to effective abatement. Treatment of the area before the major infiltration of the mosquitoes occurred gave poor results. Routine applications of DDT-fog treatments in 1954 by the drive-in operator continued to provide satisfactory relief from nighttime mosquito annoyance.

"DDT still best control in areas where flies are not resistant."

Barrier-strip spraying with DDT around individual premises will afford relief from daytime annoyance by certain pest mosquitoes. In the Savannah, Georgia area, DDT applied as a 1.25 per cent emulsion at rates of 5 to 10 pounds of DDT per acre to the outside of houses and to the shrubbery, grass, and other vegetation within a radius of approximately 100 feet of the dwelling, caused significant reduction in the daytime annoyance from salt marsh mosquitoes for periods of 1 to 9 weeks. Treatments with BHC (0.3 to 1.3 pounds gamma per acre), dieldrin (1 to 4 pounds per acre) and lindane (0.5 pound per acre) did not provide adequate abatement. The range in the duration of effectiveness of the DDT treatments is attributed to mosquito potential, more frequent treatments being required whenever weather conditions permitted high mosquito production. During 1952 and 1954 the application of 5 pounds of DDT per acre gave 5 and 6 weeks of relief from mosquito annoyance. In 1953 the same treatment was effective for 1 to 2 weeks.

Residual larviciding with technical BHC (12-per cent gamma isomer) emulsions at the rate of 1 pound per acre (in 2 gallons of finished spray per acre applied in the same manner as oil solutions) has given satisfactory mosquito control in small, landlocked, fresh-water ponds near Savannah, Georgia, against a variety of anopheline and culicine species for periods ranging from 5 to 8 weeks. No damage to fish was observed during 3 consecutive years of treatments with BHC, during which time 5 treatments were made each year, spaced at approximately 5-week intervals between April and October, for a total of fifteen 1-pound-per-acre applications during the 3-year period. There was some indication of off-taste in fish from one of the treated ponds in which unusually low water levels had prevailed at the end of the third year of treatment. It appears that technical BHC (12-per cent gamma isomer) can be applied safely as emulsions at the rate of 1 pound per acre at approximately 5-week intervals for 3 consecutive years without damage to fish.

"Malathion - sugar emulsions give housefly control from 5-8 weeks."

In ponds where fish are not present, effective control for periods ranging from 3 to 6 months has been accomplished by residual larviciding with DDT emulsion at the rate of 3 pounds of DDT per acre (in 2 gallons of finished spray), using the method usually employed in applying oil-mist sprays as mosquito larvicides. *This treatment is totally destructive to fish present in the ponds at the time of treatment and should not be used where fish are present.*

Dieldrin applied as an emulsion concentrate or as a wettable powder suspension at the rate of 1 pound of dieldrin per acre will also prevent mosquito breeding for more than 1 year in small, landlocked, fresh-water ponds. *However, it is completely destructive to certain other aquatic life,* and should not be used except in an emergency or in other unusual circumstances.

FLY CONTROL

● Sanitation

The achievement of successful fly control is contingent upon improvement in environmental sanitation and the judicious application of insecticides. Prevention of fly breeding or fly entry reduces the disease transmission potential and at the same time increases the relative value of any chemical in diminishing fly prevalence. Con-

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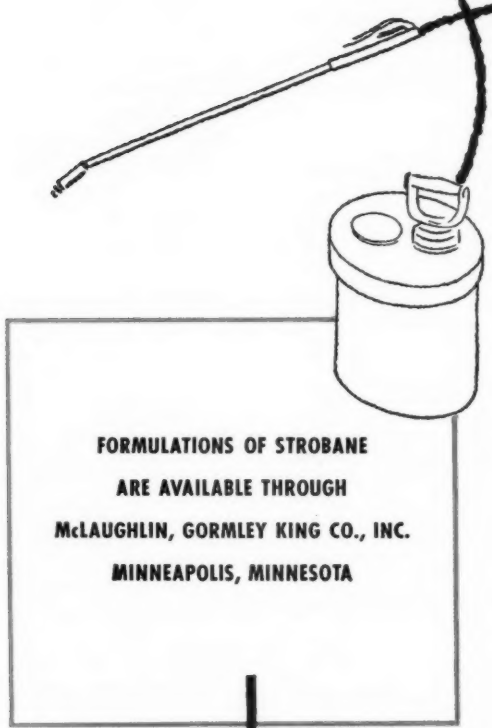

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sequently, sanitation and all practices to exclude flies from the homes, restaurants, and other places frequented by man, should be exploited to the greatest possible degree at all times.

● Residual Treatments

House fly resistance to residual applications of chlorinated hydrocarbon insecticides remains the principal problem in the fly control field. While the organic phosphorus compounds are effective against resistant strains of *Musca domestica*, none of the currently available chemicals in this group provide residues equal in durability to DDT or dieldrin.

In areas where house flies are susceptible to DDT, this chemical is still the insecticide of choice except in dairy barns or other situations where it may contaminate milk or food. Finished emulsions or suspensions of 5 per cent DDT will provide effective residues when applied to the point of run-off on the treated surface. For outdoor application, the addition of pine gum rosin to give 2 per cent rosin in the finished formulation augments the durability of the DDT residues.

Where DDT - resistant house fly populations develop, a number of other chlorinated hydrocarbons can be utilized as initial substitutes. In time, the house flies may also develop resistance to one or all of the substitute chemicals, but the onset and rate of development of resistance is contingent upon the locality and the history of insecticidal treatment. Dieldrin, applied as a 0.625 or 1.25 per cent emulsion on exterior surfaces of houses (including porches) and in animal shelters has provided satisfactory control of house flies. In certain instances, dieldrin - resistant house fly populations have developed within 2 months after the initial treatment but in other localities the chemical gave excellent results for 2 years.

Chlordane is also initially effective against DDT - resistant house flies and should be used as a 5 per cent emulsion for treatment of porches and semiprotected exterior surfaces. Application within homes should be limited to selective spot treatments using a 2.5 per cent formulation.

Lindane applied at the rate of 25 mg. per square foot or methoxychlor at 200 mg. per square foot is suitable for use in dairy barns, feed barns, and other places where the use of other chlorinated hydrocarbons might contaminate milk.

Although the use of various chlorinated hydrocarbon insecticides as residual agents in house fly control has usually entailed the chemical treatment of privies, recent studies have demonstrated that such treatments augment rather than decrease the production of *M. domestica* from these sites. Privies which were shown to be poor sources of house fly production became excellent sites for propagation of this species after receiving treatment with dieldrin. DDT deposits resulted in only a slight increase in house fly breeding. Limited tests with chlordane and BHC indicated the effect of these chemicals to be similar to

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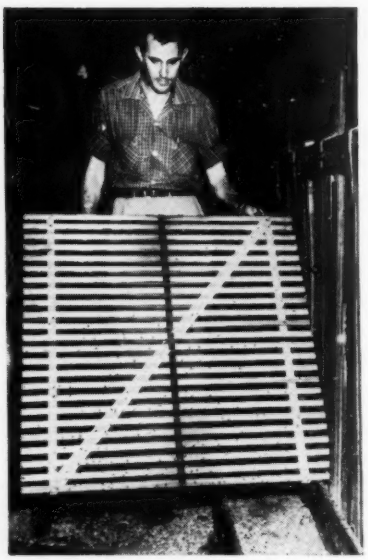
dieldrin except to lesser degree. Untreated privies continued to produce only minimal populations of *M. domestica*. The house fly populations in these test areas were resistant to the chlorinated hydrocarbon insecticides. *The current data suggest that the treatment of privies with dieldrin, chlordane, or BHC should be avoided.* Further studies are in progress to elucidate the factors responsible for the increased house fly production in treated privies.

Further field studies with Dilan indicate that the Dilan:DDT: cottonseed oil emulsion is the most suitable formulation of Dilan for control of DDT-resistant flies. Application of this formulation at rates of 200:200: 80 mg. of Dilan:DDT: cottonseed oil per square foot has provided satisfactory levels of house fly control for periods of 5 to 8 weeks in experimental barns. It can be utilized as residual treatment except in dairy barns and other locations where milk and food contamination may result.

Residual bait sprays containing an organophosphorus toxicant are currently the best means of achieving an immediate reduction of resistant house fly populations. Compounds such as malathion and Diazinon possess human toxicity levels which permit their safe usage as residual sprays at strengths of 1 to 2.5 per cent. However, where individuals are engaged in making routine applications of these toxicants, particularly Diazinon, it is desirable to maintain a periodic check on their cholinesterase levels.

Laboratory studies demonstrate that the addition of sugar to malathion emulsions definitely augments the residual efficacy of the malathion deposits. For general use with organophosphorus compounds the sugar is added to the formulation at a rate of 2.5 parts of sugar to 1 part of the toxicant.

Experimental barns treated with a Diazinon-sugar formulation at the rate of 100 mg. of toxicant and 250 mg. of sugar per square foot showed excellent control of house flies for periods of 4 to 5 weeks. The treatment



This standard wooden grill is one of many used by CDC to measure fly densities.

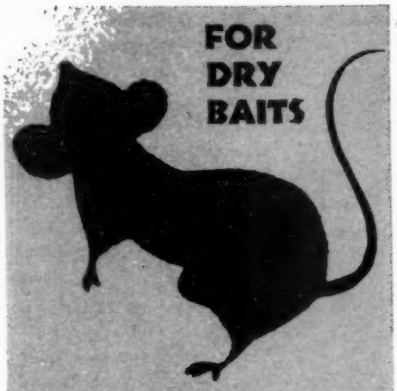
was immediately effective, the fly densities dropping to and remaining at minimum levels. Similar results were achieved with emulsion or water wettable formulations. Diazinon is not approved for the treatment of dairy barns, dwellings, or food processing plants.

Malathion-sugar emulsions applied at rates of 200 mg. of malathion and 500 mg. of sugar per square foot yielded excellent house fly control for 4 to 5 weeks. A suspension of the same strength also provided excellent immediate abatement of the fly population but its residual action was transitory, sharp increases in house fly densities occurring one week after treatment. The relatively high dosages of malathion were employed in an effort to extend the 3 weeks duration of effectiveness which previously had been obtained with a 2.5 per cent malathion—12 per cent sugar formulation. Whether the increased length of effectiveness justifies the use of the 5 per cent formulations from an economic standpoint is questionable. Malathion may be used in dairy barns as a residual treatment.

Further investigations with parathion-impregnated cords indicate this method of fly control is effective against resistant house flies for longer periods than any other type of residual treatment employing organic phosphorus compounds. Cotton cords (3/32" diameter) were impregnated with the toxicant by immersion in a 5 to 10 per cent parathion-xylene solution. After drying, the treated cords were suspended from the ceiling and rafters of buildings at a rate of 30 linear feet of cord per 100 square feet of floor area. Summarized results from treatments in experimental barns demonstrated that effective control of resistant flies could be secured for periods of 4 to 12 weeks. In several barns reduced house fly densities were apparent throughout the fly season. Similar installation of parathion-treated cords in the barns, kitchens, and on the porches of rural premises has given 8 to 11 weeks of satisfactory fly control. Excellent house fly control also was achieved for a 10-week observation period in a military dining hall and kitchen treated with parathion-impregnated cords. In Denmark, parathion impregnated gauze has been utilized extensively for fly control in barns.

Diazinon also has been tested as a cord impregnant. When the Diazinon-treated cords were prepared from a 10 per cent Diazinon-xylene solution, reduced fly densities were apparent in experimental barns for 3 to 8 weeks. In limited tests the use of a 25 per cent Diazinon-xylene solution was shown to produce treated cords which gave excellent house fly abatement for approximately 7 weeks, the indices being markedly below those obtained with the cords dipped in a 10 per cent Diazinon-xylene solution. Diazinon treated cords generally cause a more rapid reduction of house fly densities than do parathion-impregnated cords but the latter give effective control for much longer periods.

In view of the extreme toxicity of parathion, utmost precautions must be observed in preparing and handling the 5 to 10 per cent dipping solution. For the routine installation of treated cords, the individual should wear cotton gloves. Periodic checks also should be made on the cholinesterase levels of all personnel handling treated cords. As a maximum



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safeguard, treated cord should be colored or marked to avoid its possible use for purposes other than fly control. Details on precautionary procedures for parathion are found in the clinical and operational memoranda issued by the Communicable Disease Center.

● Poison Baits

Poison baits were utilized more extensively in fly control in 1954 than at any time previously. The basic formulation of both liquid and dry baits consisted of a potent toxicant and a fly attractant (molasses, sugar, or other). Organic phosphorus compounds such as malathion, Bayer L 13/59 (Dipterex*), and Diazinon were the principal toxicants used and have largely replaced TEPP for that purpose.

Liquid baits generally are composed of 0.1 per cent toxicant and 10 per cent attractant. Application is by means of a sprinkling can, and the bait is distributed at a rate of 1 gallon per 1000 square feet of floor area. If the floor surface is dirt or is covered with debris, the bait should be sprinkled on paper or on metal or wooden sheets.

Dry baits are formulated to contain 1 to 2 per cent toxicant and an attractant. The latter may be granulated sugar or an inert carrier coated or mixed with an attractant. Such baits are scattered over the floor surfaces at a rate of 2 to 4 ounces per 1000 square feet. Where debris is present, the bait should be placed in a container or on a sheet of wood, metal, or other relatively smooth material.

General coverage of the floor area with either type of bait is not desirable. Observation will show the sites of greatest fly concentration and bait applications should be made at those points. Occasionally it may be necessary to utilize sites other than those on the floor level (window sills, stanchions).

The frequency of bait application depends largely upon the fly potential present. Where the potential is high, repeated applications are necessary. Reports indi-

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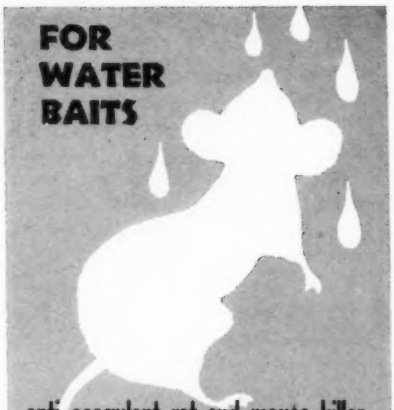

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cate that the need for daily applications ceases after several weeks of routine treatment so that subsequent coverage can be reduced to every third or fourth day. The bait itself may remain toxic for 1 to 2 weeks but under conditions where floor surfaces are washed or swept each day, this residual action is of little value.

Preliminary studies by the Entomology Research Branch, U. S. Department of Agriculture, indicate that poison baits containing malathion or Bayer L 13/59 will give excellent reduction of blow flies in dump areas. For general use against blow flies and house flies at such sites, the most effective formulation contained 2 per cent toxicant and 50 per cent black strap molasses in water.

The chief values of baits lie in their relatively low cost per treatment and their immediate suppressive effect upon fly densities. Bait applications in barns with high fly densities can produce spectacular reductions within a few hours. However, this degree of control is of short duration unless repeated applications are made.

Baits containing malathion and Bayer L 13/59 are acceptable for use in dairy barns but Diazinon poison baits should not be applied therein. None of these three poison baits should be used inside homes.

● Outdoor Space Sprays

Where house flies are no longer susceptible to available residual or larvicidal treatments, space sprays are the only alternative for chemical control in a community program. Daytime applications on an areal basis are generally used in municipal operations but nighttime treatments of specific fly resting sites offer promise, particularly at animal shelters, abattoirs, and dumps where heavy fly concentrations normally exist. During cool weather, house flies move inside of buildings at night, but when warm weather (minimum daily temperature 70° F. or above) prevails, this species tends to rest on shrubs, high grasses, and the lower limbs of trees. Where fly populations are high, the nighttime use of space sprays is of value. For best results, surveys to determine the nighttime fly resting sites should be conducted in order to guide spray operations. As space sprays are toxic only to the flies coming in contact with the insecticidal droplets, treatments must be repeated at frequent intervals for satisfactory fly control.

Combinations of DDT with DMC at ratios up to 20:1 have yielded satisfactory mortalities of DDT-resistant flies. In field usage, a ratio of 7.5:1 of DDT: DMC proved effective against house flies resistant to several chlorinated hydrocarbons. Emulsions or fuel oil solutions of this combination should contain 5 per cent DDT.

DDT-resistant house flies also can be killed by a 2.5 per cent Dilan emulsion applied at a dosage of 0.1 pound per acre, or by 2.5 per cent chlordane emulsions sprayed at a rate of 0.2 pound per acre.

Where flies are resistant to DDT and chlordane, a 5 per cent technical BHC (12 per cent gamma isomer) emulsion or a 2 per cent lindane emulsion may be used effectively for outdoor space spray treatments. If odor is not a factor, the technical BHC is favored because it is cheaper.

Pyrethrum space spray is the least toxic to man and is among the most reliable as an insecticide. For indoor space spray treatments it is the insecticide of choice. Pyrethrum formulations are used in combination with synergists (piperonyl butoxide, sulfoxide, and other) in emulsions or oil solutions containing from 0.05 to 0.1 per cent pyrethrins and from 0.5 to 1.0 per cent of the synergist. While pyrethrum formulations usually are too expensive for general large-scale application in fly control, their use at problem sites is frequently feasible.

Preliminary tests with malathion in fuel oil indicate that it will provide effective kills of resistant house flies when applied by a mist blower at a rate of 0.5 pound of malathion per acre.

● Larvicides

The use of larvicides may be desirable for fly control in certain situations, as in the treatment of dirty garbage cans, or concentrated fly breeding areas such as stockyards or chicken farms. Several of the chlorinated hydrocarbons are effective fly larvicides, but their use may cause, and possibly accentuate, the development of the same resistance encountered when they are used as adulticides. Where house flies are not resistant to them, chlordane, lindane, BHC, dieldrin and aldrin

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can serve as effective house fly larvicides. These materials should be applied at the same dosages per square foot as recommended for residual sprays. In general, it appears desirable to dilute the residual spray emulsions or solutions to three to five times their original volume to provide for better penetration of the larval breeding medium. In view of the effect of chemical treatment upon house fly production in privies, the latter should not be sprayed with dieldrin, BHC, or chlordane (see page 14).

In limited treatment of accumulated chicken droppings heavily infested with *M. domestica*, Diazinon applied at a rate of 50 mg. of Diazinon per square foot proved highly effective.

Small-scale field tests show that applications of paradichlorobenzene crystals (PDB) at the rate of 2 oz. of PDB per garbage can will control house fly breeding for 1 to 2 weeks. This procedure is effective in areas where flies are resistant to other types of larvicides.

As blow flies continue to remain susceptible to chlorinated hydrocarbons, these chemicals are effective in preventing blow fly infestation of carcasses and in controlling blow fly breeding established in carcasses. Limited studies have shown that dog carcasses sprayed with 1 pint of 0.25 per cent aldrin, endrin, or Diazinon emulsion were protected from blow fly infestation for 26 to 30 days. Chlordane (0.5 per cent), BHC (1.0 per cent, (15 per cent gamma)), and malathion (0.25 per cent) were less effective. In carcasses heavily infested with larvae, 0.25 per cent emulsions of endrin, Diazinon and malathion and 0.5 per cent emulsions of dieldrin and aldrin gave complete kill of full grown maggots. Concentrations of 2.0 per cent chlordane and 5 per cent BHC were required for effective reduction of the infestations.

The control of fly larvae resolves itself more into a problem of application than one of the availability of a compound toxic to the larvae. In all larvicidal treatments, emphasis must be placed upon getting the insecticide to the site where it can act upon the larvae. Since most larvicides also act as adulticides, spray applications should be directed to locations where the emerging adults will contact the chemical when they leave the breeding media.

In general, the continued use of any of the various chlorinated hydrocarbons appears to lead eventually to the development of resistance to that insecticide in the house fly population. Since the rate at which such resistance will develop varies with the individual locality, it is not possible to forecast the future status of an individual chemical. To ascertain when an insecticide begins to lose its efficacy against the house fly population and to determine whether a substitute chemical can cope with a resistant population, it is desirable to conduct periodic checks on the susceptibility levels of the resident house fly population.

With the growing utilization of organophosphorus compounds in fly control, such resistance determinations assume prime significance. Although there is no reported instance to date where *M.*

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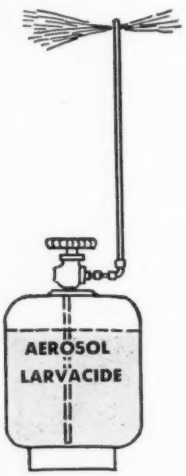

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domestica has become resistant to such chemicals in field usage, laboratory selected strains resistant to Dilan or highly resistant to DDT have been found to be markedly less susceptible to one of the candidate organophosphorus compounds for use in fly control. Preliminary studies with topical applications of other organophosphorus compounds to these two strains suggest that the loss of susceptibility is common to several insecticides now employed in fly control. Whether such laboratory findings can be translated into field significance, only future use experience with the organophosphorus toxicants will determine.

FLEA CONTROL

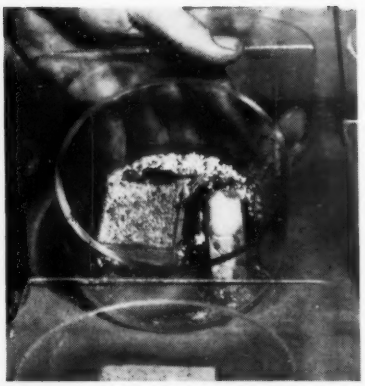
In field tests conducted over a period of 3 months, a 5 per cent DDT dust has been found to be as effective as a 10 per cent dust when applied to rat runs and harborage areas for the control of the oriental rat flea. Although the 5 per cent dust has been used on certain operational programs, most operators prefer to employ a 10 per cent formulation, particularly where it is desirable to control other ectoparasites more resistant to DDT, as for example, the cat flea.

A 10 per cent chlordane dust is effective against soil infestations of cat and dog fleas. A single application of this material will give effective control of an infestation, in contrast to the repeated applications necessary with DDT.

In situations where cat and dog fleas are resistant to DDT and chlordane, data from the Entomological Research Branch, U. S. Department of Agriculture, indicate that malathion and lindane emulsions applied at a rate of 10 mg. of toxicant per square foot are effective.

ROACH CONTROL

A 2 to 2.5 per cent emulsion or oil solution of chlordane has been the accepted chemical for spot spraying for roach control in homes and food establishments. In addition to chlordane, dieldrin as an 0.5 per cent solution or as a 1.0 per cent dust is now available for the same purpose. Such treatments should be confined to limited harborage areas, such as the space behind baseboards, in cracks and crevices, and around openings through which roaches may gain entrance from the outdoors. Over-all applications of either chemical should not be made in homes.



Roaches in glass dish are part of USDA test to discover better control chemicals and techniques.

Since 1952 it has been demonstrated in various cities of the United States that the German roach *Blattella germanica*, under conditions of repeated exposure to chlordane residues, can develop marked resistance to this chemical. As such resistance to chlordane does not appear to be common to other species of cockroaches, this chemical still is of general value in roach control. Observations indicate that the organophosphorus compounds (such as malathion) offer promise in the control of resistant roaches.

BED BUG CONTROL

The application of 5 per cent DDT oil solutions or emulsions to the baseboards, wall crevices, bedsteads, and mattresses of infested rooms usually provides excellent control of the bed bug. However, in certain localities in the United States and Japan, DDT-formulations have not given satisfactory control of bed bug infestations. Laboratory studies by the Entomological Research Branch, U. S. Department of Agriculture, with bed bugs from these areas revealed that the insects are highly resistant to DDT residues. Preliminary tests with lindane, chlordane, dieldrin, and aldrin against these DDT-resistant strains have shown lindane to be the most effective chemical.

Because the occurrence of DDT resistance in bed bugs is currently restricted to a few localities, DDT remains the insecticide of choice for bed bug control.

RODENT CONTROL

The importance of sanitation, including proper garbage disposal, food storage, harborage elimination, and ratproofing, must be emphasized. Sanitation is essential to the permanent control of commensal rats and mice, and the use of rodenticides should be regarded as supplementary to sanitation.

The situation with regard to rodent control is quite encouraging, since rats, unlike insects, do not appear to have developed resistance to the available poisons. The slow-acting rodenticides warfarin and pival are preferred for use in most situations because of their effectiveness and low degree of toxic hazard to humans and useful animals.

● Warfarin

It has been shown that the susceptibility of the various species of commensal rodents to warfarin differs. Accordingly, in the interest of economy and safety, the lowest bait concentration consistent with the most effective control should be used.

Dependable control of the roof rat *Rattus rattus*, requires the use of a concentration of 0.250 mg. of warfarin per gram of bait (0.025 per cent). However, field tests have shown that a concentration of 0.050 mg. per gram (0.005 per cent) is effective for control of the Norway rat (*Rattus norvegicus*). Mice react in the same general way as Norway rats, although they show more individual variation. There is evidence that under certain conditions Norway rats may be controlled a little more rapidly, though no more surely, by use of bait containing 0.100 mg. of warfarin per gram of bait instead of a concentration of 0.050 mg. per gram There is a real opportunity for those associated with city and county programs to determine, by careful operational observations, which of these two concentrations is more desirable for use in organized control campaigns to be car-

(Continued on page 54)

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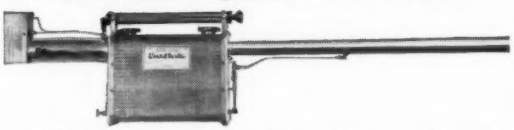

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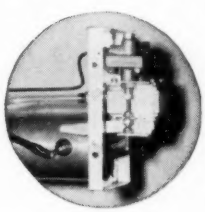

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Preventive Pest Control Stressed at 1955 Purdue PCO Conference

Sell Customers "Insurance" Service Before Trouble Begins Speakers Urge

If you have to use chemicals inside a food plant to secure insect and rodent control, it's too late to stop contamination of foodstuffs. The damage has already been done, said Walter W. Dykstra, U. S. Fish and Wildlife Service, Washington, D. C., who called upon PCOs to sell preventive service to their customers as he explained the problems operators will run into now that the Food and Drug Administration is again enforcing a rigid policy of cleanliness to keep filth out of food (PC Feb. '55, p. 5, 38). More than 300 operators attending the 19th annual Purdue PCO Conference at Lafayette, Indiana, January 31 - February 4 heard Mr. Dykstra and other conference speakers emphasize sanitation as a potent, but much disregarded, weapon in the PCO arsenal.

"We're passing into a stage in control where we must prevent infestations rather than clear up the trouble after it comes," Mr. Dykstra said. "Chemicals are a useful tool, but you must offer the food plant operator a program of preventive maintenance in order to do any kind of a job at all. Destroy all possible danger zones in your customer's plant, or in plain English, just practice good housekeeping."

Other speakers blasted the lack of proper preventive sanitation in such diverse fields as bird, termite, fly, and rodent control. Again and again it was pointed out stop trouble before it starts, or when that is impossible, hit the infestation at its source.

During this year's five-day conference experts from all over the U. S. gathered on the Purdue campus to lead PCOs through the intricate problems of insect identification and damage, control of occasional invaders, rodent control, safety, new chemicals, and termite control. Additional information was distributed to attendees at workshop sessions, informal get-togethers, and question and answer periods.

Customary opening day sessions were again pointed towards first and second year registrants with all operators meeting in the morning for opening exercises at Agricultural Hall. While beginners separated into classes to take in lectures on insect biology, structure, and control; and laboratory periods on identification and recognition of damage; "old-timers" attended meetings on sight recognition of insects and control of rodents and birds. Lecturers at these sessions included Professors G. E. Lehker, B. E. Montgomery, J. J. Davis, H. O. Deay, J. V. Osmun, and F&WLS assistant district agent, W. D. Fitzwater.

• Chemicals For Bees, Wasps

Tuesday, PCOs sat in on six concurrent sessions dealing with the "pest of the year"—"invading and occasional pests." Dr. H. O. Deay handled the identification of these insects, which occasionally plague housewives, while other speakers delved into biology and control recommendations.

There are 1721 species and 212 varieties of wasps, and 2955 species and 292 varieties of bees found in the United States reported Dr. B. E. Montgomery who chaired the important problem of bee and wasp control.

According to Dr. Montgomery bees and wasps can be readily distinguished from one another by the body hair. "Bees are very hairy," Professor Montgomery said, "and the hairs are all branched. Wasps, on the other hand, are not so hairy and their body hairs are not branched. One major difference in their habits is that bees are exclusively plant feeders while wasps prey on other animals as their main food source."

For control of both bees and wasps Dr. Montgomery recommended a mixture of 1 tablespoonful calcium cyanide and 5% chlordane dust placed in a common garden duster and applied directly to the hive. Good results are also obtained from a 1% lindane dust.

After the initial kill in and around homes a residual spray should be applied to keep them from re-occupying nests. When bees have been removed from the walls of homes, seal the openings. Then tear out the wax and honey collected in the voids to stop secondary invaders.

At another "pest of the year" session, B. G. Berger, of Able Pest Control Co., Springfield, Ohio; and J. O. Rowell, extension ento-

Of the 300 delegates attending this year's session, three have been present at all nineteen conferences.

mologist from Virginia Agricultural Experiment Station, Blacksburg; tackled the biology and control of boxelder bugs, elm leaf

Arnold Mallis chuckles as he remembers how he used to raise black widow spiders at his home in California.

beetles, crickets, strawberry root weevils, and cluster flies.

About 60% of the PCOs attending the conference have been receiving complaints of boxelders. Best control seems to be 2½ pounds of 40% chlordane to 100 gallons of water applied directly to boxelder trees. In the fall, a ½% dieldrin spray applied outside the home usually gives good control. Inside the dwelling, vacuum cleaners will scoop up most of these pests. Most effective indoor chemical formulation seems to be an oil solution or emulsion of one of the chlorinated hydrocarbons.

As with boxelders, elm leaf beetles can be curbed by applying chemicals directly to infested trees. An application of 2 pounds 50% wettable DDT powder to 100 gallons of water applied with an orchard sprayer has given noticeable results. Inside the home, the best bet seems to be a vacuum cleaner.

Cricket migrations into homes can be halted by attacking breeding areas which are usually located in dumps or trash piles near the infested structure. Sprays of chlordane and DDT are both reported good around breeding areas as is toxaphene. For inside control try either 2% chlordane or 5% DDT in stainless oil.

Strawberry root weevils are not a common household pest but are sometimes annoying in homes. Lindane applied as an emulsion to strawberry patches, and 2% chlordane emulsion to baseboards around houses works best.

Maggots of cluster flies are parasites of earthworms and overwinter in homes. For control, attempt to eliminate the earthworm population by treating lawns with a chlordane wettable powder spray at the rate of 2 tablespoons of 50% chlordane to 100 gallons of water. Inside, any of the residual sprays are good.

• Black Widow Control

Spiders, millipedes, centipedes, and sowbugs came under fire from J. D. Mock, Arwell, Inc., Waukegan, Ill., and Arnold Mallis, Gulf Research and Development Company, Pittsburgh, author of the **Handbook of Pest Control.**

PCOs attending this session showed most interest in control of the black widow. Areas to watch for black widow infestation report these two experts are lumber and scrap piles, water and gas meters, shutters, drain spouts, privies, and the under areas of structures. Again, sanitation can play a large part in reducing the spider population. Inside dwellings, any of the chlorinated hydrocarbons are satisfactory. Chlordane applied to the soil under houses gives excellent results, as does 16 pounds of 50% wettable DDT to 100 gallons of water at the rate of 100 milligrams per square foot.

Millipedes and centipedes eat decaying plant and animal life and are usually driven into the house in the fall because of heavy rains. Infestations can be nipped in the bud by dusting 50% DDT wettable powder around building foundations. Sowbugs can be effectively eliminated by using any one of the chlorinated hydrocarbons.

• Screens, Repellents Stop Small Insects

W. K. Delaplane, Jr., Illinois Pest Control Service, Champaign, Ill., teed off on other occasional invaders in his talk on leafhoppers, thrips, psyllids, springtails and psocids.

Not too much is known about leafhoppers. Adequate screening and repellents applied to screens seem to be the best available control weapons. Experiments with pyrethrum have shown it to be a good tactile repellent for leafhoppers.

Thrip control is the same as for leafhoppers. About all you can do is suggest tighter screening and apply some repellent to the screens.

About the only known way to stop psyllids is to put out repellents such as Crag fly repellent, pyrethrum and rotenone.

Since springtails feed on bacteria and fungi, dry up the building you are treating to eliminate them. Any contact insecticide such as dieldrin gives a good kill.

Drive out psocids just like you get rid of book lice by eliminating moisture. Contact insecticides also give good control.

• Clover Mite Tips

Clover mites have again joined the parade of high nuisance pests as operators report many calls during 1954 from plagued homeowners seeking relief. On hand to cover this important problem was Professor John V. Osmun of Purdue.

Professor Osmun said three steps in chemical control are necessary to blitz clover mites:

1. Outside the dwelling apply a spray barrier 10-15 feet wide on the grass and shrubbery all the way around the infested building. Then spray the side of the house from the ground up to, and including, the first floor windows and window frames. Use a 0.5% malathion emulsion in 30-40 gallons of water per 1000 square feet.

2. Treat the basement with a 1% malathion emulsion (either masked or deodorized) and apply spray evenly around windows, at

Purdue botanist, **Dr. O. C. Lee,** drives home the need for caution in lawn weed control.

top of the foundation, around the plate, and at end of joists. Follow this by spraying the entire basement wall surface.

3. Inside the first floor of the dwelling, best procedure is to spray the baseboards along all outer walls, windows, sills, frames and cross pieces with a 1% malathion solution (either masked or

deodorized) in refined base oil. This 1% spray can be formulated by using 1.1% of the chemical concentrate (90% malathion plus 10% xylene), 16% aromatic oil, and 82.9% refined base oil.

Other chemicals which have given good control are aramite, chlorobenzilate, Dimite, and pyrethrum, rotenone aerosol formulations.

• Weed Control May Become Profitable PCO Sideline

Tuesday evening delegates gathered in the Union Club on the Purdue campus to hear talks on weed control by University botanist, Dr. O. C. Lee, and PCO Dr. Lee C. Truman, Pest Control Services, Inc., Indianapolis, Ind.; and an address on the origin, activities and future of the NPCA by its past president A. E. Ritt, Vogel-Ritt, Inc., Philadelphia.

Over one-third of the delegates said they are now actively engaged in the profitable sideline of weed control. More indicated they are alive to the potential of this field by showering Dr. Lee and Dr. Truman with questions about formulations, applications, and markets for this service.

Crabgrass is a major pest of lawns throughout much of America, Dr. Lee said, and should be razed in the early spring when seedlings are just beginning to sprout. Suggested chemicals for crabgrass are PMA, potassium cyanate, Crag 1, and 2,4-D. Both PMA and potassium cyanate will stay on the soil for 10-14 days destroying any seedlings that might emerge.

However, Dr. Lee said it might take at least three applications at 10 day intervals in May and June to protect lawns from crabgrass. He added that chlordane had been tried without success in crabgrass control.

A note of caution was injected into the discussion when Dr. Lee warned that these herbicides can have an injurious effect on ornamentals and other valuable plants if the operator is not careful. Wind can move spray particles from the operational area to where other plants are growing. For this reason Dr. Lee recommends herbicidal materials be applied at low pressure, on a calm, windless day. Other precautions include using a hooded sprayer held close to the ground and a TeeJet nozzle with 25-35 psi. Dr. Lee added that the more water used in a spray the less chance there is of the chemical drifting.

Candid camera catches **J. J. Davis** (left) going over plans for next year's conference with **Lee C. Truman** (center), and **A. E. Ritt.**

The herbicide 2,4-D, not only good for killing crabgrass, will control all types of broadleaf lawn weeds, Dr. Lee said. There are two types of 2,4-D, amine and ester. He recommends only the amine type for lawns, playgrounds, etc., because it is less volatile and less injurious to shrubs. This chemical is most effective when applied during the period when conditions are ideal for plant life. According to Dr. Lee, one pound per acre is enough to destroy all broadleaf weeds.

Most effective destroyer of plant life and best to use around industrial areas is CMU (Telvar W), Dr. Lee continued. It has a long lasting residual effect and will keep plants from growing for several years. However, CMU is not recommended in locations where there are useful plants because it kills all vegetation.

Woody plants can be destroyed by employing 2,4,5-T. Dr. Lee reports 1 gallon of the chemical mixed with 100 gallons of water gives good results. For trees, spray a 1-25 oil mixture on the trunk to a height of 3 feet. Watch the drift so other vegetation is not injured or killed.

Dr. Lee C. Truman blasted PCOs for "thinking too small" when it comes to industrial weed control. "Don't be afraid to ask a reasonable price for a job of this type," he exclaimed, "even if your estimate is seven or eight hundred dollars. That's just a drop in the bucket to many of the large companies.

"But you have to get out and sell these jobs because they won't come into your office after you. We make an average of 50 calls for each sale. But it's a profitable business, in fact, on a percentage basis, there's more money in it than in general pest control."

Dr. Truman says lawn and highway weed control is not too profitable but industrial weed control can be sold on a money making basis to firms who want to eliminate fire hazards, trims around fence lines, and rodent burrows.

Dr. Truman left PCOs with this note of warning, "Understand mathematical tolerances before you enter weed control. Over dosages can get you into a lot of trouble and cost you money in damage suits, and under dosages will just be a waste of time and materials."

Closing out Tuesday's evening program, A. E. Ritt praised the advances the NPCA has made in raising standards of the pest control industry and predicted the association will continue to make progress in better control techniques and business practices.

• Up-to-Date News On Anticoagulants

Rodent control occupied the center of the stage at another conference session, as four speakers covered anticoagulants, rodent baits, mouse control, and animal repellents.

At the rostrum to explain the present status of anticoagulants was W. D. Fitzwater, F&WLS assistant district agent headquartered at Purdue.

Effectiveness of anticoagulants, said Mr. Fitzwater, depends on these four factors: (1) **Species**: Pival is the best material to use against roof rats and house mice while warfarin gives better control of Norway rats; (2) **Sex**: Females are generally killed faster than males; (3) **Baits**: Must be attractive in order to induce rats and mice to pass up natural food sources; (4) **Proper placement of baits**: Should be placed in areas where rodents are feeding.

Here are the anticoagulant baits recommended by the F&WLS for rat and mouse control:

Dry Bait

Whole ground yellow corn	60%
Rolled oats	25%
Anticoagulant (.5%)	5%
Granulated sugar	5%
Corn Oil	5%
Malathion (95% technical)	0.01%
Charcoal-Activated USP	0.05%

Water Bait

Anticoagulant	.005%
Versene (Pival only)	.1%
Sodium benzoate	.1%
Granulated sugar	5.0%
Tapwater	weight/volume

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baits, Mr. Fitzwater said, is to keep the pivalyn in solution. It is not necessary to add this chemical to warfacide. Sodium benzoate preserves the bait and increases its palatability.

• Purdue Rodent Bait Project

First report on the Purdue PCO research project on rodent baits was presented by Dr. Harlan Shuyler, Conservation Industries, Kansas City, Kansas.

In the five year period 1949-1954, Dr. Shuyler experimented with 274 different types of rodent baits.

The best single bait found by Dr. Shuyler was:

92.5% horsemeat
5.0% chocolate milk
2.5% confectioners' sugar

Mix chocolate milk into the horsemeat before adding sugar. Then add 3% poison. Best time to place the bait is in the early evening. Baits can be prepared in advance and frozen until ready for use, Dr. Shuyler says.

When using anticoagulants the following bait was found to be most acceptable:

42.5% fresh whole field corn
42.5% oats
5.0% crude corn oil
5.0% confectioners' sugar
5.0% anticoagulant

• Mouse Population Study

Experiments conducted in house mice control at the University of Wisconsin were described by Dr. John T. Emlen, Jr., chairman of Wisconsin's Department of Zoology.

"Such studies as these," he explained, "may seem academic and far removed from your pressing problem of how to kill mice. Pest control is a complex problem, not just a matter of simple removal of unwanted objects. You can pump a pool dry, but to dry up a stream, you've got to go to the source. A mouse population is a stream, continuously replenished by a tremendous reproductive potential."

• Eight Suppliers Exhibit

Wednesday afternoon PCO suppliers held an equipment demonstration in the judging pavillion under the direction of Professor Glen E. Lehker. Companies represented were:

Whitmire Research Laboratories, St. Louis, Mo., three pound and ¾ pound D.A.I. aerosols; **Pest Control Equipment Co.,** Mount Vernon, N. Y., 1 gallon sprayer, three gallon sprayer, Ray-O-Vac flashlight; **Aegis Laboratories, Inc.,** Chicago, Ill. "No Roost" bird repellent; **Orb Industries,** Philadelphia, Pa., fly aerosol, odorless lindane product, and Challenger sprayer; **B. & G. Co.,** Philadelphia, Pa., C-100 air compressor for termite drilling, 2 quart hand sprayer, 8 gallon sprayer; **The Tanglefoot Co.,** Grand Rapids, Mich., Tanglefoot tree banding compound, Indusprayer and Difuso insecticide; **Dyna-Fog Sales & Service,** Hammond, Ind., Dyna-Fog machine; and **Acme Proctection Equipment Co.,** South Haven, Mich., gas masks and cannisters.

Other PCO suppliers who did not take part in the demonstration but who had exhibits in the Union Building include: **Virginia Smelting Co.,** West Norfolk, Va., Lethalaire aerosols; **McLaughlin Gormley King Co.,** Minneapolis, Miss., dipterex in tablet form, roach concentrate 933, pival, and other insecticides; **William Cooper & Nephews,** Chicago, Ill., Mal-Oil 50, a deodorized oil soluble malathion; **Larvacide Products Co.,** New York City, Larvacide and aerosol Larvacide, Larvabrome-20 and EDB; **Donco, Inc.,** Englewood, Colo., pivalyn and rodent bait stations; **Velsicol Corp.,** Chicago, Ill., chlordane, heptachlor; and **Turtox Biological Supply,** Chicago, Ill, plastic imbedded specimens of insects.

Professor Osmun demonstrated an electric Tokheim atomizer for flies based on the centrifugal

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force principle to disperse aerosols mechanically. This device is reportedly adjustable from fine mist to heavier application for a residual and creates enough turbulence to spread insecticides throughout an inside area of 100,000 cubic feet.

• Mouse No. 1 Grain Pest

Wednesday evening's keynote speaker, Walter W. Dykstra, assistant chief Branch of Predator & Rodent Control, F&WLS, Washington, startled PCOs by telling them the house mouse has passed the Norway rat to occupy the number one position as most serious pest to grain handlers and shippers. "We'll have to learn a lot more about the house mouse if we are to adequately protect the nation's grain," Mr. Dykstra remarked.

Just how is grain contaminated by insects, rodents, and birds? Mr. Dykstra pinpointed six situations between the farm and eventual consumer of the finished product where these pests might contaminate grain.

(1) Five to nine per cent is contaminated in the field by mice and other rodents which chew on stalks and feed on the grain after it has been cut.

(2) The combine is an attractive potential home for insects, rodents, and birds. It is seldom cleaned while laying idle between harvests and thus offers a ready-made contaminating chamber for grains as they are thrashed.

(3) Granaries may be infested by rats and mice before grain is ever stored there.

(4) Country elevators are kind to rats and mice. In many cases PCOs poison rodents but their dead carcasses often wind up in the grain.

(5) Railroads are also friendly to rodents. Often clean grain is contaminated by the time it reaches its destination by rats and mice that make frieght cars their home.

(6) While grain is sometimes contaminated in mills, millers are making an earnest attempt to clean their establishments. However, says Mr. Dykstra, rodent control in food plants is still a big headache.

"In order to completely protect a food plant from rats and mice it may be necessary to put out protected bait stations as far away as ¼ mile from the buildings," he added. "And there is still a place for the old fashioned snap trap in food plant rodent control, especially in the feed storage rooms.

"Conditions are constantly changing. Things you did last year will be antique next year," Mr. Dykstra concluded.

• Traps, Sound for Birds

Bird control was the final subject on Wednesday evening's program as a panel of three experts stepped to the microphone to lead PCOs in a question and answer session on trapping and distress calls.

W. K. Delaplane, Jr., Illinois Pest Control Service, Champaign, told delegates he has been getting fair pigeon control around municipal buildings with a large loft type trap using whole or cracked corn as bait. However, he said many problems arise in this type of control project, such as how to get water to the birds, how to hold costs down, and how to keep the humane society from raising a rukus.

Another speaker, Jack O'Reilly, Plunket Exterminating Co., Minneapolis, Minn., disagreed with Mr. Delaplane on the type of trap to use, saying his firm has found

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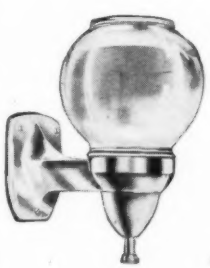

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Federal Revisions of

DISCLOSE TRUE PICTURE

The U.S.D.A. recently issued revisions of their regulations covering the labeling of pesticides (Interpretation 18) and, specifically, the labeling of household insecticides containing chlordane (Interpretation 19). Both of these revisions are official recognition that chlordane is not only low in toxicity but, further, it can be used to much greater advantage in the home than previously indicated.

CHLORDANE GETS LOW TOXICITY RATING

The revision on Interpretation 18 sets up four categories of toxicity. The four categories, or classes, are explained below.

Class I—Most Toxic. Labels for insecticides in this category must picture the skull and crossbones, the word POISON, the antidote, a warning, and the statement "Call a physician immediately."

Class II—Less Toxic. For these insecticides it is necessary only to show a warning on the label.

Class III—Lower Toxicity. This is the category in which chlordane is placed. On chlordane labels a caution statement is all that is required.

Class IV—Very Low Toxicity. None of the above indications are required on labels for insecticides in this classification.

As mentioned above, chlordane (in all strengths, including technical) is placed in Class III. The skull and crossbones, the words "Poison" or "Warning," or antidote statements are not required for chlordane formulation labels...and never have been required in the past.

WIDER USE OF CHLORDANE PERMITTED

Interpretation 19, which deals exclusively with the labeling of chlordane formulations, was also revised to recognize the low toxicity rating. The ruling now permits the use of chlordane for controling a wider range of insects inside the home. Added are houseflies, mosquitoes, wasps, box elder bugs, crickets, spiders, centipedes, scorpions and clothes moths. The former list included roaches, waterbugs, silverfish, ants, brown dog ticks and carpet beetles.

In addition, increased chlordane concentrations are now permitted. Liquid concentrations, oil solutions, emulsions and self-propelled sprays can be increased from 2½ to 3% chlordane. Dry powders may now contain up to 6% chlordane instead of 5%.

MORE FAVORABLE TOXICITY BROADENS METHODS OF APPLICATION

The revision on Interpretation 19 states that, "The directions for killing houseflies, wasps and mosquitoes indoors shall provide for thorough and repeated spraying, painting or dusting of selected surfaces such as doors, around windows and areas frequented by these insects." In other cases directions call for a "thorough" treatment of infested areas rather than a generally restricted "spot" treatment formerly required.

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Interpretations 18 and 19 on CHLORDANE TOXICITY

Why did the U.S.D.A. revise Interpretation 19?

The new revision states: "Since issuing Interpretation 19 on September 11, 1951, certain new facts concerning chlordane as it is now being produced have been established. Technical chlordane, as marketed for insecticidal uses prior to 1951, contained considerable amounts of hexachlorocyclopentadiene as an impurity. It has been shown that the presence of this compound was a factor in the hazard of the early chlordane. Present manufacturing processes can eliminate more of the hexachlorocyclopentadiene, and technical chlordane should not now contain more than 1% of this compound. On the basis of this change in composition of technical chlordane, certain changes are justified in the original Interpretation 19."

To go one step further, let us state that since the beginning of 1951, the Velsicol Corporation has been the only producer of technical chlordane. All chlordane produced since that time has contained less than 1% hexachlorocyclopentadiene.

EARLY REPORTS ON CHLORDANE TOXICITY NOW OBSOLETE

Since the very first unfavorable reports on chlordane toxicity, Velsicol has conducted an extensive test program in its own laboratories and has sponsored research by independent institutions to determine the conditions under which hazards might exist. These widespread tests on mice, rats, pigeons, chickens, rabbits, dogs, cattle and on humans disclosed that the unfavorable reports had been caused by two things—either early chlordane containing excessive amounts of hexachlorocyclopentadiene had been used, or there were extenuating circumstances involved which were not brought to light at the time.

LONG TERM CHRONIC EXPOSURE

Men employed at the Velsicol plant making technical chlordane are exposed to the product eight hours a day, five days a week. Three doctors examined a group of these men who had been working in this plant for periods up to five years. Complete chemical and physical tests were made. Not a single individual showed any detectable effect.

Pest control operators throughout the country have used chlordane under a variety of conditions over a long period of time. We have not heard of a single authenticated case of any operator having been injured by chlordane toxicity. There have been several PCO service men who have claimed that they have been injured. In each case investigation has shown that their difficulty was due to other causes.

THE VELSICOL GUARANTEE

The Velsicol Corporation tests each batch of technical chlordane and guarantees that the hexachlorocyclopentadiene content is less than 1%. Velsicol also runs bio-assays on each batch to check the killing power against test insects (roaches), and guarantees that the insecticidal effectiveness meets the same standard that has been effective for many years.

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CHLORDANE TOXICITY REPORT

the small, two compartment trap to be best, mainly because it is easily transported from one site to another.

Next, Walter Dykstra returned to the rostrum to give his observations on starling control by means of sound. Mr. Dykstra said last year he witnessed an experiment in Baltimore to drive starlings from an area of the city by broadcasting amplified distress calls from a truck. At the end of the evening three-fourths of the birds had been chased away but they took up residence in nearby roosts.

Consensus of opinion was that distress calls certainly have a place in starling control but there are still many technical problems to be ironed out.

• Safety Hazards Stressed

Thursday morning's entire program was built around one word — safety. A symposium of five authorities gathered in the Union Club to rip into careless, unsafe PCO operations and to give advice on the best way to attain safe, trouble-free operations.

Communicable Disease Center's Dr. Wayland J. Hayes led off with a discussion of toxicological hazards. "Toxicological hazards involve two concepts," he said, "toxicity — which refers to the inherent ability of a compound to cause injury, and hazard — which refers to the likelihood that injury will occur under some specific set of conditions. For instance, a material may be safely sprayed on fresh fruits and vegetables yet this same insecticide may be fatal if a drop of it gets in a man's eye or if it is swallowed by children."

Proper formulations and equipment, correct operating procedures, storage precautions, adequate labeling, safety equipment, ventilation and dust proofing, and decontamination will eliminate most of the hazards accompanying insecticide use, Dr. Hayes concluded.

"If in doubt, don't do it," said R. M. Russell, Technical Director, Orkin Exterminating Co., as he took up the vital subject of safety to the serviceman. "Before you apply a chemical understand all about it," he continued. "Use the right concentrations and apply it correctly."

According to Mr. Russell safety doesn't stop at the proper use of insecticides. "Make sure your servicemen are careful drivers and obey all traffic rules," he cautioned. "Many, many more men are injured by careless driving than by insecticides. And, instruct your employees to be extremely careful when using electrical tools. Always remember to ground electrical equipment."

Other safety measures Mr. Russell recommended were to label all insecticides properly, wash hands after using any chemical, and to always carry a flashlight and rags.

Dr. Ralph E. Heal, NPCA Executive Secretary next covered the touchy problem of product damage hazards. "The main protection against property injury lies in the PCO's ability to think," Dr. Heal emphasized. "Safety lies not only in the training of servicemen but in the PCO's knowledge. Educate yourself in product safety, pass it on to your help, make sure they follow it, and you will have little trouble."

Five important "don'ts" were emphasized by Dr. Heal. Don't use **(1)** odorous chemicals around food; **(2)** oil base solvents on as-

knock-out the odor in Insecticides and other strong-smelling Chemical Specialties with CHLORSCENT

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phalt tile; **(3)** over applications of a chemical; **(4)** fumigants around sensitive materials; and **(5)** thermo generated fogs inside buildings. "These situations are loaded with dynamite," he concluded, "so be extremely wary of them."

Following Dr. Heal to the speakers' platform, Dr. Frank Princi, University of Cincinnati, Cincinnati, Ohio, took up safe use of insecticides. "Use of insecticides does not provide immunity to other diseases," Dr. Princi said. "If a man is ill from any cause, he should not apply toxic materials. This is one of the greatest safety factors of all!"

Dr. Princi pointed out three ways in which insecticides poison humans:

Ingestion: Insecticides can be swallowed accidentally without a person actually eating them. A man not wearing protective gloves might wipe his hand across his mouth and so get some of the toxicant into his system.

Inhalation: In open spaces this is rare, but in closed quarters inhalation of the toxicant can be dangerous. Protective masks are only good as long as they are used correctly. Make your serviceman understand how to use and maintain protective masks.

Skin Contact: This is by far the most common method of insecticide intoxication. Ordinary clothing is not always sufficient. Remember, hands and faces are also covered by skin!

Dr. Princi ended his address on this note: "Greatest intoxication hazards are present during the formulation of materials. Many servicemen don't know proper formulating and stirring procedures, so make sure your men are well trained or supervise this phase of the operation personally."

Bernard E. Conley, Secretary of the Committee on Pesticides, American Medical Assn., Chicago, Ill., attacked certain advertising practices which make false and misleading claims about the relative toxicity of insecticides, and questioned the value of "negative" labeling on many packaged pesticides.

"We must discipline ourselves to set an example of careful and cautious respect for pesticides before our family, our employees and our customers," Mr. Conley said. "For after all, constant vigilance in the final analysis is the price we pay for safety."

Termites and other wood destroying insects took over the spotlight Thursday afternoon.

Karl Hassler, of the Neil A. Maclean Co., Los Angeles, spoke on the always ticklish problem of subterranean termite control. He told TOs fumigation is ideally adapted to the problems which are present in this type of control.

"The materials and methods of soil fumigation offer an approach to subterranean termite control which aims to destroy insects rather than merely divert them," Mr. Hassler said. "Much more experimental work is needed to properly evaluate fumigants in termite control, but the promise is bright and prospects are exciting. Fumigants will scarcely replace any of the tools presently in the kit, but they are useful additions to jobs where the older and more familiar methods perform poorly."

• FHA Tentative Specs For Soil Pre-Treatment

One of the outstanding conference highlights was a report by Dr. Ralph E. Heal on the January

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27 meeting between the Forest Service, FHA, and NPCA to iron out FHA specifications for soil pre-treatment of slab houses. At the request of the FHA, Forest Service officials have come up with this set of tentative recommendations to guide the termite control industry in applying soil poisons:

Chemicals and Concentrations

Benzene Hexachloride—0.8% gamma isomer (in oil solution or water emulsion).
Chlordane—1 or 2% (either as emulsion or oil).
DDT—8% in oil (must be used in oil solution).
Dieldrin—0.5% or 1% (In oil solution or water emulsion form).
Lindane—0.8% (oil solution or water emulsion).
Sodium Arsenate—10% (in water).
Trichlorobenzene and No. 2 fuel oil, 1-3 by volume.

Applications and Rates

(a) Buildings with crawl spaces
1. Over-all treatment under attached porches or entrance platforms. **1 gallon to 10 square feet.** No requirement for over all treatment under house.
2. Treatment of critical areas under house (along inside of foundation walls and around service entrance areas). **2 gallons to 5 lineal feet.**
3. Treatment along outside of foundation walls:
   Shallow wall—**2 gallons to 5 lineal feet.**
   Deep foundation—**4 gallons to 5 lineal feet.**

(b) Buildings with concrete slab on ground
1. Over all treatment under slab and attached porches. **1 gallon to 10 square feet all over.**
2. Treatment of critical areas under slab (along inside of foundation walls and around service entrance areas.) **2 gallons to 5 lineal feet.**
3. Treatment along outside of shallow foundation wall. **2 gallons to 5 lineal feet.**

(c) Buildings with basements
Treated exactly the same as for buildings with crawl spaces (Sec. a.)

(d) Voids of exterior walls
Forest Service says these sites do not have to be treated but NPCA says they do.

"This development with the FHA is one of the greatest potentials we have ever had for expansion of the termite control industry," Dr. Heal said, "and it can be extremely profitable. But we have a bear by the tail. We're going to have to police ourselves to do a good, thorough job."

On the ticklish problem of what to guarantee, Dr. Heal said TOs will probably have to stand behind termite jobs for a period of five years. He added that this field might become even bigger than anticipated because the FHA is considering a move to require that all government insured slab homes be soil pre-treated for termites.

Cooperation between the termite operator and real estate agencies in California has been a real bonanza to both, Herbert R. Packard, Jr., Packard Termite and Pest Control Co., Los Angeles, told TOs in another address.

Fish and Wildlife Service officials, **Galen Oderkirk** (left), and **Walter W. Dykstra** on way to one evening session. Mr. Dykstra carries bowl of wheat to demonstrate extent unchecked rodents contaminate grain.

"In California, before property changes hands a termite inspection by a licensed operator must be made and a report filed. Practically all TOs charge for making this inspection and report. But if it's wrong it can come back to 'haunt' you."

Mr. Packard said this law had definitely improved the termite operator's standing in his community and his services have become an accepted part of almost every real estate loan or sale in the state today.

• Powder Post Beetles

Next, Ira Hatfield, of Monsanto Chemical Co., St. Louis, Mo., stepped to the rostrum to give some pointers on powder-post beetle control.

"Many operators get into trouble because they don't recognize the difference between termite and powder-post beetle damage," Dr. Hatfield said. "It is the larvae of the powder-post beetle which does most of the damage. They operate along the grain, usually of sapwood, and emerge as adults, leaving lots of frass behind.

"One of the big difficulties in control is to get penetration of the wood. But if the chemical is placed into the emergence holes it will generally get distribution and kill the bugs.

"Pentachlorophenol and DDT in mineral spirits or slow volatilizing oil are both good," Dr. Hatfield continued. "But watch how you handle the chemical. Don't spray oil soluble material into walls where you might get into trouble by taking the insulation off wires. Make sure baseboards are not damaged when spray is applied to the floor."

• Dieldrin for Roaches

"Dieldrin is 8-10 times as toxic to American and German roaches as chlordane according to USDA research charts," said Dr. W. D. McCauley, Shell Chemical Corp., Denver, Colo. "However," he added, "dieldrin is not recommended for chlordane resistant roaches even though the residual properties of dieldrin are superior to chlordane.

"Dieldrin is only 1/30 as volatile as lindane and aldrin and has a vapor pressure sliyhtly higher than that of DDT," he advised.

• Dry Baits for Flies

Another industry representative, Dr. C. C. Alexander, of Geigy Agricultural Chemicals, Bayonne, N. J., gave PCOs latest information on dry baits for fly control. "Baits will never eliminate residuals or space sprays," Dr. Alexander cautioned, "but they do have their place in fly control."

Dr. Alexander recommended baits be placed on horizontal surfaces around heavy fly populations with sugar added as an attractant. For control of maggots, he suggested a bait consisting of 1 pound diazinon to every 100-200 square feet.

Annual banquet was held Thursday evening in the ballroom of the Purdue Memorial Union with Dean Frank C. Hockema, vice president of the University, acting as toastmaster. Speakers included Dr. F. L. Hovde, president of Purdue; Dr. H. J. Reed, Dean of the College of Agriculture; Dr. George C. Decker, president of the Entomology Society of America; Harlem B. Ives, NPCA president, and Ralph E. Heal, NPCA Executive Secretary. Principal speaker of the evening was Dr. Frank R. Hall, of Purdue's history department.

During the banquet, certificates for attendance at all 19 Purdue Conferences were presented to Harlem Ives, Rose Exterminator Co., Detroit, Mich., and NPCA president; C. Norman Dold, Rose Exterminator Co., Chicago, Ill.; and W. W. Scott, Arwell, Inc., Waukegan, Ill.

Professor J. J. Davis, head of Purdue's Entomology Department was in charge of the conference.

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Convert "Profitless" Pest Jobs to the Black Side of the Ledger, Dr. Neely Turner Tells

150 At Eastern Conference

Psocids, earwigs, wood roaches, larder beetles, etc. are headaches to PCOs because customers never realize the extra time it takes to clean up such nuisances. But, "Most of the pests usually considered 'profitless' can be controlled by recognized and reasonably effective methods . . . and should contribute to a substantial volume of business," Dr. Neely Turner emphasized between puffs on his corncob pipe while addressing the better than 120 delegates that attended the 15th annual Eastern PCO conference at the University of Massachusetts in Amherst, February 3-5.

Calls for the control of the many hundreds of pests not regularly included in contract jobs are very likely to increase rather than decrease, the Connecticut agricultural experiment station state entomologist predicted. "This increase should be accepted as an evidence of progress and not rejected as a nuisance. Any operator should feel complimented when he is selected as **the** source of information on pest control.

"Perhaps the most certain way to profit by these 'profitless' pests is to operate on a professional rather than a service basis. The doctor, engineer, lawyer and accountant is paid for his information and advice. He does not offer 'free' inspections or 'free' service of any kind. These men seldom 'guarantee' results, whether one visit or a monthly service is given. There is a proverb that people respect what they pay for, and that free service is worth as much as it costs." Such was Dr. Turner's prescription for making these jobs pay off.

Emphasis for the two-and-a-half-day meet lay on identification and control of occasional invaders with rotating laboratory sessions directed by Dr. C. P. Alexander, head of the entomology department, and Dr. W. B. Becker, of the entomology staff.

Visiting professor Dr. John B. Schmitt from Rutgers' entomology department lectured on the habits and behavior of such 'low-profit' pests as millipedes, centipedes, dog ticks, clover mites, springtails, booklice, crickets and elm leaf beetles.

One millipede, Fontaria virginica, encountered in the East, is a forest floor insect that is non-injurious to man, but does swarm over lawns and driveways by the thousands looking for "breathing space." Even though such invasions last only about three weeks and die off quickly, relief is demanded once they start. It was once necessary to plow a furrow around the whole house, but today a thorough coverage of the lawn with 15 to 20 pounds of 5% malathion dust does the job, Dr. Schmitt reported. Such an application is made with a rotary blower, treating a band 40 feet wide encircling the property, in the evening or when there is no wind.

House centipedes need warmth and moisture, preferring fluid water and do not overwinter in unheated habitations. They live in houses hunting insects and related forms at night, sometimes falling into bathtubs, etc. from walls or ceilings. Dr. Schmitt suggested orthodichlorobenzene as an effective indoor pesticide.

Coming next to ticks, the New Jersey expert selected the brown dog and American dog tick, the former being of lesser importance as a disease bearer. Brown dog ticks are a domestic indoor pest of dogs, not found out-of-doors in the North, and very rarely bite man. American dog ticks do **not** breed in buildings, but readily bite man. Immature forms attack rodents and rabbits and adults feed on dogs and large animals. Often picked up in grass, brush, and debris by dogs, they are thus brought into the house and frequently drop off. Control of the American dog tick which transmits Rocky Mountain spotted fever is to dust grasses and bushes with DDT. Usually brown in appearance, the larval stage may be blue or purple after it has gorged itself with blood.

Even though today's accelerated home building boom has made the clover mite appear to be a new headache to man, it was first recorded as invading a house in 1881. Dr. Schmitt attributes present day problems to new methods of house construction which include straight unbroken wall areas from ground level to first floor windows. Typical are those made of concrete blocks or with stucco siding. Older houses that have protruding clapboard siding above a brick or stone foundation provided a barrier over which clover mites could not swing. Thus infestations were most commonly confined to basements.

An untried control suggestion Dr. Schmitt offered was attaching a malathion-soaked felt strip all around the foundation of new homes.

Harmless, yet annoying springtails are sometimes found in flower pots, in basements, under firewood, or window ledges and occasionally enter houses in great numbers. They are an extremely common plant pest with remarkable resistance to cold weather. Dr. Schmitt recommended the application of DDT dust outside and lindane on window ledges to halt an invasion.

Male wood roaches are often a problem of summer cottages in early spring months, because during that season they have wings. Females have none. Neither can establish itself in the house, is harmless to man and does not attack food. Screens halt flight indoors and a 25-lb. bag of calcium chloride thrown under a cottage

Even though the weather was brisk, Eastern Conference delegates paused between sessions to pose for this group picture.

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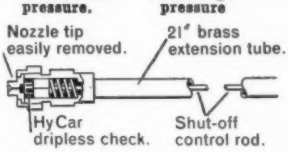

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has given control of this outdoor roach, Dr. Schmitt reported.

Window screens placed over fireplace chimneys are one way to stop the ingress of elm leaf

Conference chairman was **Prof. Arthur I. Bourne** (left) and two guest speakers were **Dr. John B. Schmitt** from Rutgers and **Dr. Neely Turner** of Connecticut (right). Seated is **John K. Medoff,** general chairman regional conferences and banquet toastmaster.

beetles. (Don't forget to remove such a finely meshed screen in winter before fireplaces are lit.) This pest, which cannot reproduce inside a house is nevertheless ingenious in seeking out crevices in man's abode. Fumigation is not an effective control, but the application of a DDT emulsion with a miticide on their host elm trees is effective. Malathion may be used without adding a miticide.

For common black crickets which move indoors in cooler weather, Dr. Schmitt prescribed broadcasting 5% chlordane dust around the house.

• Why Are They Profitless?

Dr. E. H. Wheeler, Massachusetts extension entomologist, pinpointed four reasons why these miscellaneous insects are profitless. First he laid the blame on homeowners unwilling to pay fully for control service. Difficulty of proper identification without visiting the prospect who may figure the pest is not worth the expense, is another reason. Often repeat trips, for which no charge can be made, are necessary because control is difficult. Possibly most significant is the fact PCOs fail to do the whole job thoroughly because they know there is no profit in it and thereby fail to satisfy the customer.

It's important to handle these jobs well, Dr. Wheeler says, because of their public relations and advertising value, and because the experience gained from controlling them will enable operators to handle future jobs more profitably.

• Cluster Flies and Fumigation

Cluster flies which rest on vegetation in mild weather were reported a pest frequently associated with fumigation. One delegate found that when airing a house following fumigation, the premises would become invaded with cluster flies which entered through open windows, doors, etc. He's found it necessary to use an aerosol treatment to kill off the flies.

Flies, their habits and breeding sites was the topic of Dr. B. V. Travis from Cornell's entomology department. Although control measures should be aimed at all life stages, sanitation and elimination of breeding sites are of prime importance, the speaker explained.

Other speakers on the program arranged by Professor Arthur I. Bourne, U. of Mass. professor of entomology, included Dr. Philip J. Spear, NPCA technical director, who reported on late developments revealed at the association's convention; Howard A. Merrill, Fish & Wildlife Service district agent, speaking on control of pigeons, starlings and sparrows; and John C. Jones, F&WLS Washington representative, who repeated the need for effective rodent control in all stages of edible grain production. Representatives from chemical companies explained toxic properties of diazinon, parathion, malathion, dipterex, chlorothion and others. One speaker reminded delegates techniques of application and observance of sanitation are far more important than any of the new pesticides that are or will become available.

• Seven Attend All Fifteen

John K. Medoff, Hudson Exterminating Co., West New York, N. J., was toastmaster for Friday night's banquet at the beautiful Lord Jeffrey Inn. Seven delegates were given commemorative certificates for having attended every one of the 15 PCO conferences held by the university. They are: Connie Bohman, Ray Bigelow, George Elliott, Charles Houghton, Charles Pomerantz, Thomas Sheehan, and David A. Weisburger. Conference chairman David P. McAlindin announced that Donald E. Lewis would be chairman of next year's program, February 2-4.

Four suppliers exhibited their lines of PCO products and demonstrated them in the Grinnell Arena in a program chaired by Dr. Harvey L. Sweetman, of the university's entomology department. The exhibitors were Jack Benmosche of Pest Control Equip-

Wasting no time getting started on his appointment as 1956 Eastern conference chairman, Rochester PCO **Donald E. Lewis** (left) confers with Mass. U. entomolgy staff, **Drs. Marion E. Smith, Harvey L. Sweetman,** and department head **C. P. Alexander.**

ment Co., Blanton Whitmire from Whitmire Research Laboratories, William Buzel and William Hart of Virginia Smelting Co., and Drs. John Lembach and Thomas Fisher of Residex Corp.

AMA On Vaporizers

So-called insecticide fumigators promoted and advertised as completely safe are not harmless and should be used with "extreme care," says the American Medical Association's committee on pesticides in a recent issue of the Journal of the American Medical Association. The group said that today the trend toward misuse of fumigation vaporizers and toward making untrue claims for their safety appears to be growing. It warned that chemicals in these devices can be dangerous if accidentally swallowed or even inhaled.

Govan Gets Arab Scholarship

James Govan, a graduate of the Harrisburg, Ill., High School, has received an Arab Pest Control Co. scholarship to Wabash College. This full-tuition award became effective with the fall semester of 1954.

While at Wabash, Govan will major in zoology and minor in chemistry. During the summer months he will have an opportunity to work with Arab chemists and entomologists to coordinate his academic training with the applied phases of commercial pest control.

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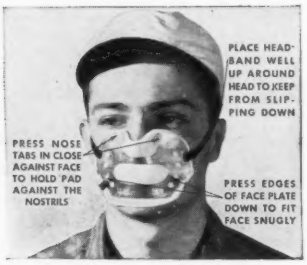
PLACE HEAD-BAND WELL UP AROUND HEAD TO KEEP FROM SLIPPING DOWN
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135 PCOs Hear Heal, Bedingfield, Howell, Bowers at February 7-9

Oklahoma A. & M. Conference

Over 135 pest control operators from Oklahoma and adjoining states traveled to Oklahoma A. & M. College, Stillwater, on February 7-9 for the 5th Annual Oklahoma A. & M. PCO Conference.

A full, two-day program covered such diverse subjects as chemical preferences, fly control, legislation, resistant roaches, termite inspections, silverfish, fumigation, and public relations.

Dr. Ralph E. Heal, NPCA Executive Secretary, told delegates there were many advantages involved in using anticoagulants over other types of rodenticides. He said pival is a repellent to insects, and mold and fungus growth, while both pival and warfarin are good, safe rodent killers.

Switching to fly control, Dr. D. E. Howell, head of the A. & M. Entomology Department and conference chairman, revealed organic phosphates have almost completely replaced chlorinated hydrocarbons. Reason for this, he said, is shown in research work completed in California where a strain of flies was developed that lived entirely on a diet of chlorinated hydrocarbons. Through constant contact with the insecticide over a period of many generations, the flies built up a strong resistance factor.

Organic phosphates, according to Dr. Howell, are effective as either baits or residual sprays. Four types of baits being used at the present time are wet, dry, varnish, and string.

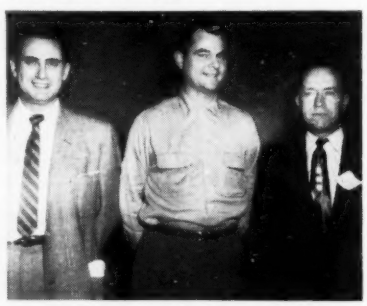
During another conference session, Clyde Bower, entomologist with the Oklahoma State Department of Agriculture, gave a report on the new Oklahoma structural pest and termite control law.

The law requires all pest control operators to be licensed by the state and to file reports of jobs with the state department of agriculture. This body in turn spot checks the operators' work to see that it meets specifications laid down by law. During the past year, several operators have had licenses revoked for failure to comply with it.

Mr. Bowers stressed that the law is designed for the protection of both the homeowner and the honest, reliable operator.

Resistant roaches were brought into the picture by W. D. Bedingfield, B. & R. Exterminating Co., Corpus Christi, Tex., who told PCOs resistance itself is not the problem. Making customers understand there is such a phenomenon is the difficulty.

NPCA president, **Harlem Ives** (right), and executive secretary **Dr. Ralph E. Heal** answered delegates' questions about their association plans for 1955.



New OPCA officers elected during the conference. (Left) **Charles Rosenthal,** Tulsa, president; (center) **W. J. Pinkston,** Oklahoma City, vice president; and **A. M. McIntosh,** Tulsa, secretary-treasurer.

Mr. Bedingfield said he has been running tests on the chlordane resistant German roach problem with chlorthion, dipterex, and Malrin. Chlorthion emulsion gives residual roach control for about three weeks in homes and other structures where movement of the roaches can be tolerated for several days after treatment. However, Mr. Bedingfield does not recommend it for restaurants or other establishments where immediate kill is necessary, unless an oil base chlorthion with a little pyrethrum added, is used.

"Dipterex emulsion, as far as I am concerned, is one of the better residual insecticides that I have had a chance to field test since chlordane failed," Mr. Bedingfield said. "There is little odor and complete kill usually occurs about a week or ten days after the chemical is applied." However, he said it is not too

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*Bait based upon research studies at Purdue University and especially developed for the pest control industry.

½ lb. pkg. $ .50 (48 per carton)	25 lb. pkg. $ .46 lb.
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practical for general pest control work because there is no effect on roaches for an hour or two after it is sprayed.

Malrin is the most practical chemical for control of resistant German roaches at the present time, Mr. Bedingfield continued.

Mr. Bedingfield said some PCOs have found the answer to resistant roaches in the use of a roach powder manufactured by the Hand Chemical Co., Oklahoma City.

Silverfish control was taken up by Tillman Zeigler, Dead Shot Chemical Co., Oklahoma City. Mr. Zeigler said best interior chemical control seems to be 2% chlordane in a highly refined solvent base oil, with piperonyl butoxide and pyrethrum added.

Other valuable talks were given at this year's meeting by Eugene Wheeler, Veterans' Administration Loan Officer; J. Earl Griffin, Aggie Chemical Co., Tulsa; Harold Schnorrenberg, Dead Shot Chemical Co., Oklahoma City; Robert R. Schendel, Schendel Pest Control, Topeka, Kansas; Professor Cliff Elder, Oklahoma A. & M. College; and M. S. Buckley, Industrial Fumigant Co., Kansas City, Mo.

During the conference, members of the Oklahoma Pest Control Association elected Charles Rosenthal, Orkin Exterminating Co., Tulsa, president. Other new officers are: vice president, W. J. Pinkston, Capitol Termite Co., Oklahoma City, and secretary-treasurer A. M. McIntosh, McIntosh Termite Control, Tulsa. Tom Graham, Graham Pest Control, Oklahoma City, was picked as the chairman of the advisory board on termite control.

Rodent Control, Sales, Termites Featured at Fifteenth Annual

Southern PCO Conference

By DR. O. W. ROSEWALL
Chairman, Department of Zoology, Louisiana State University, Baton Rouge

"Man is rat's best friend," Dr. Kent Littig, chief of insect and rodent training section, Communicable Disease Center, Atlanta, Ga., told delegates to the 15th Annual Southern PCO Conference, held at Louisiana State University, Baton Rouge, January 31 - February 2. The conference is sponsored by LSU in cooperation with the NPCA and Louisiana Pest Control Association.

Dr. Littig said rats depend upon man for food, water and harborage. PCOs must know rodent habits before trying to exterminate them, he added.

Rats have a "strange object" reaction, Dr. Littig continued, which is often responsible for their avoiding traps.

Robert M. Russell, technical director for Orkin Exterminating Company, advised that rodent baits should be checked every two or three days. He listed corn meal, sugar, rolled oats, corn oil, and peanut oil as attractive rat baits.

Troublesome problem of what to do about fungi was covered by Dr. Ira Hatfield, Monsanto Chemical Co., St. Louis, Mo. Dr. Hatfield discussed the effect fungi has on lumber and how it may be mistaken for termite damage.

"Public relations is the way the telephone is answered," said Ben B. Graves, Standard Oil Company of Louisiana, as he explained public relations in selling. "It is also the way the employees refer to the boss, and the way the company car is driven."

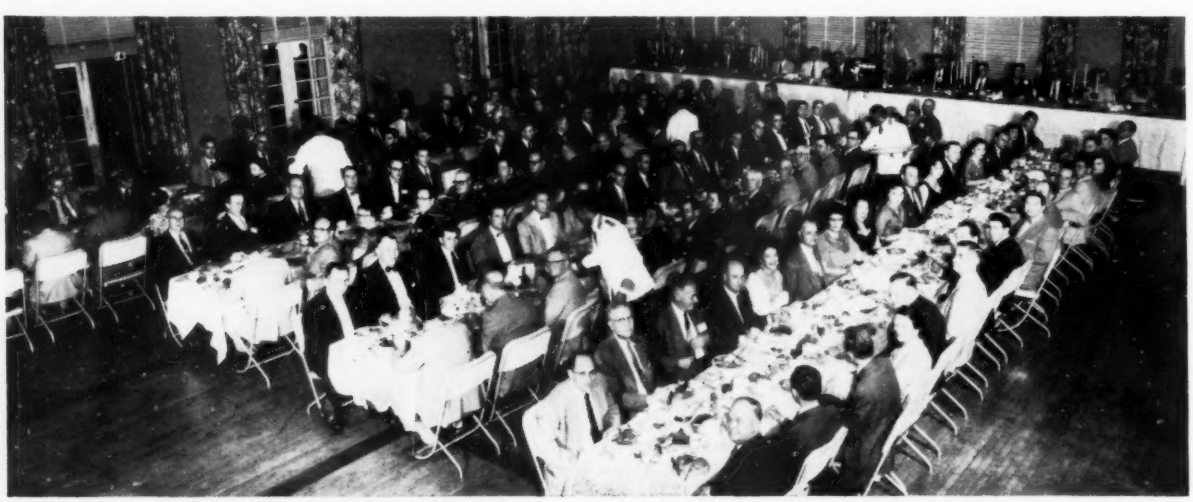
Additional sales tips were given by Selby Gillis, Poster Process Co., New Orleans, who said, "The salesman must have enthusiasm, and must be proud of his product and employer." Three factors which make up a good salesman, Mr. Gillis said, are persistence, a sense of timing, and a business approach to customers.

"The little house fly is becoming more and more of a problem throughout the country," said Dr. Philip J. Spear, NPCA Technical Director, speaking on current developments in fly control. Though just half the size of a normal fly and similar in general appearance, the little house fly is 85 times more resistant to DDT, but 10 times more susceptible to dieldrin."

At another business session, Jerry Goodman, of B. & D. A. Weisburger, explained what kinds of insurance PCOs should carry for complete protection.

Termite conference speakers included C. B. Anderson on, "Slab Construction and Conventional Treatment"; and Myron W. Smith on, "Pitfalls and Cautions in FHA and VA Work." A panel discussion on these two subjects was carried on by L. F. Bewick, R. E. Couhig, and J. L. Howell.

Dr. O. W. Rosewall was in charge of the conference.



Highlight of Southern Conference is always the annual banquet served in true "Southern style."

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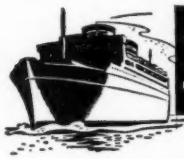

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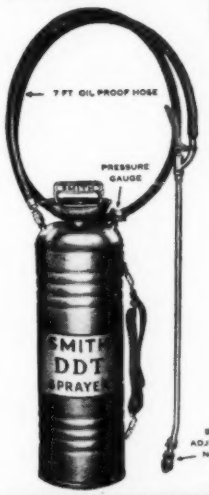

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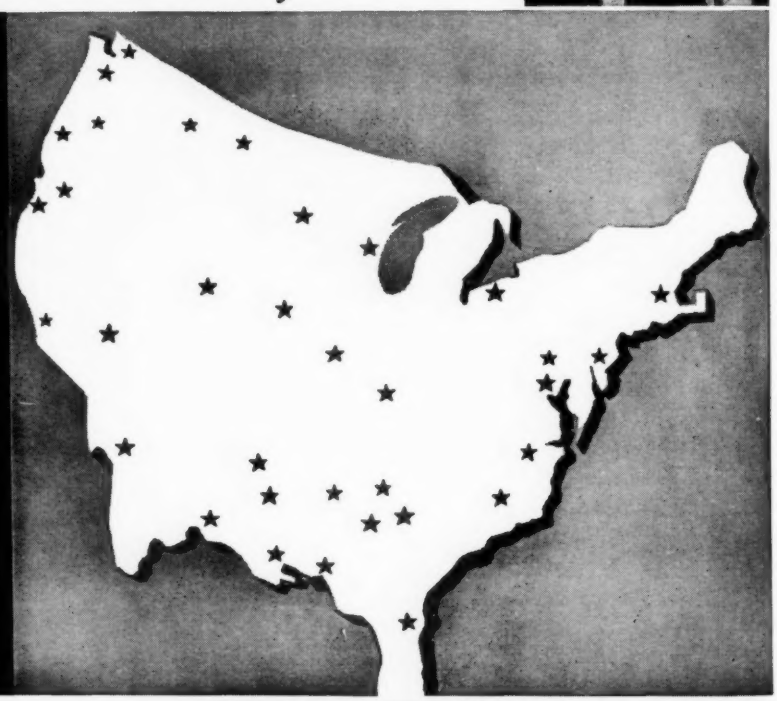

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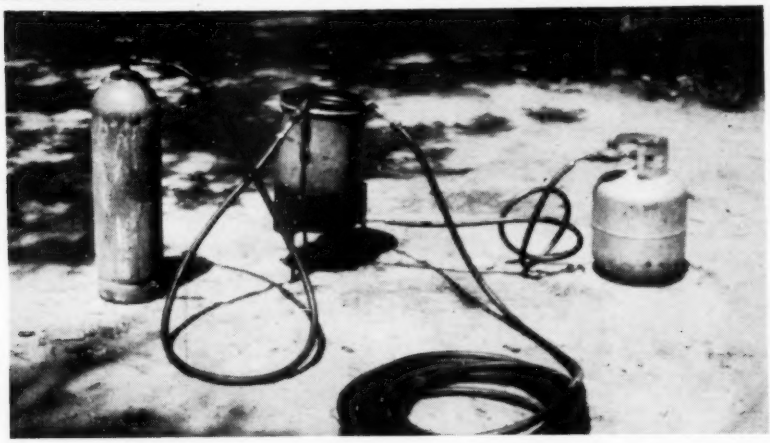

Young's heat-exchanger is home-made device consisting of (1) methyl bromide cylinder, left; (2) copper heating coil in 5-gallon bucket on simple metal stand which holds LP gas burner, center, and (3) a trailer-size bottle of LP gas, right. ½ inch rubber hose is used to connect all parts.

Inexpensive Heat-Exchanger for Methyl Bromide Dry-wood Termite Fumigations

by T. ROY YOUNG, Jr.

Young-Jones Laboratory, Inc., Tampa, Florida

In the application of methyl bromide gas for the control of dry-wood termites, it is desirable to use a heat-exchanger to replace the heat of vaporization lost when the gas was originally compressed into the cylinders. Gas being compressed becomes hot and this heat is dissipated into the atmosphere. When this compressed gas is allowed to expand again, it must pull in an equal amount of heat from its surroundings. This, of course, is the refrigeration principle used in all of our refrigeration and cold storage plants. Temperature of the fumigant is important in fumigating a building. The dosage of gas and duration of the fumigating time can be varied with the temperature — the higher the temperature, the more active and more effective is the gas.

In our own method of applying methyl bromide, we run the gas into a sealed house through a hose the end of which is placed into a wash tub. When a heat-exchanger is not used, the expanding gas freezes at the end of the hose in a form similar to dry ice. Quite often this causes the condensation of moisture from the air and forms methyl bromide hydrate which does not evaporate during the entire period of fumigation. Should any of the liquid run out on the floor or spatter on furniture, the varnish might be removed.

This "frosting" of the hose end also causes considerable delay in getting the gas into a building. However, our primary reason for wanting the gas heated is to take advantage of the greater effectiveness of hot gas that gives more rapid dispersion and better penetration into termite tunnels.

Of course, the refrigeration action of expanding gas does not lower the temperature of the air inside an entire building to any appreciable extent, but since it is the temperature of the gas itself which determines its molecular activity, anything we can do to rapidly replace the "heat of vaporization" is desirable. This is more important when the outside temperatures are low, but we do find advantages in using a heat-exchanger even when outside temperatures are in the upper 80's.

The accompanying illustrations show an effective heat-exchanger which we built at very little cost.

Figure One. 5/8" copper tubing was coiled by hand around a cylinder and both ends were brought out together at one end of the coil. Eleven turns of the tubing will just fit into an empty

Figure One. Eleven turns of ⅝ inch copper tubing serves as coil through which methyl bromide is heated before entering building being fumigated.

5-gal. chlordane bucket. On one end of the coil we put a female flare adapter 5/8" OD (outside diameter) x 5/8" and on the other end we sweat-on with silver solder a 5/8" OD x ½" male pipe adapter red chase bevel fitting. Fittings were made by the Arrow Products Company, 447 Lincoln Street, Carlstadt, New Jersey.

Figure Two. This illustrates inserting coil into 5-gal. bucket over the stand we had made up at a welding shop. Stand holds the bucket and has space underneath for an LP (liquid petroleum) gas burner.

Figure Three. A trailer-size bottle of LP gas is connected to the burner by a 5 ft. section of rubber hose, and burner-ring is inserted under stand (lower left in picture).

Figure Four shows a close-up of the LP gas burner.

In operation, the chlordane bucket containing the coil is filled with water and heated to boiling. The cylinder of methyl bromide is connected to the coil with a short section of ½" rubber hose and the fumigant is introduced into the house to be fumigated through a ½" rubber hose attached to the other end of the coil. We tried using ¼" and 3/8" rubber hose, but found too much time was required with these smaller hoses.

I understand that essentially all of the fumigators in California use heat-exchangers of one sort or another. We find them quite necessary to do an effective fumigation job for dry-wood termite control.

Figure Two. Coil is then inserted into 5-gallon bucket which rests on metal utility stand with pan half-way down to hold LP gas burner ring.

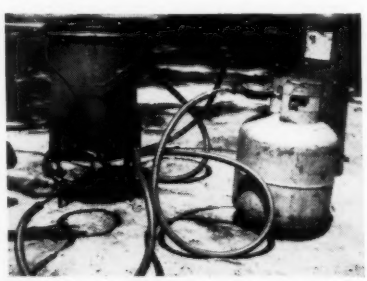

Figure Three. Burner ring (lower left) is inserted in stand holding covered 5-gallon bucket. Once ring is lit, hoses all connected, unit is ready.

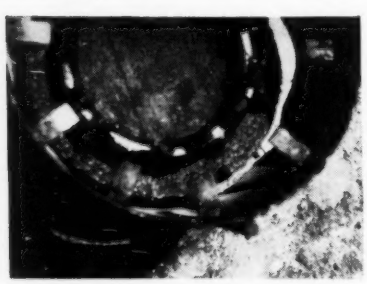

Figure Four. Close-up of LP gas burner ring in stand. Such an assembly can be homemade or purchased from a hardware or plumbing supply house.

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Electromagnetic drive — only one moving internal part.
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A NEW Portable Spraying & Termite Treating Unit With A Pump That Does Away With Your Pumpaches

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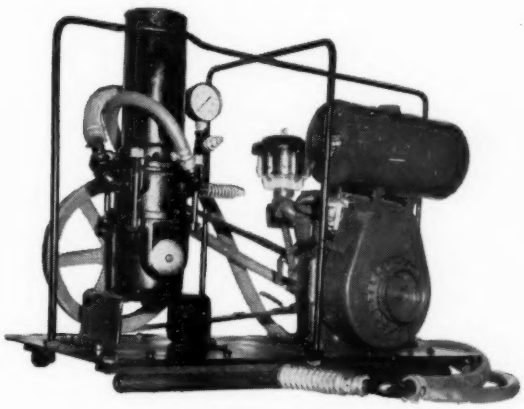

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Sprayer is equipped with new type diaphragm pump designed especially for applying those ABRASIVE AND CORROSIVE solutions that damage the conventional type pump beyond service in a few days. It's economical too, a new set of pumping parts cost only $4.25 and take less than 10 minutes to install on the job. An extra kit of pumping parts comes with each sprayer, no skilled mechanic is required to install the kit. Sprayer is powered by husky 2½ HP, 4 cycle, air-cooled, Clinton Gasoline Engine. Pump delivers up to six gallons per minute at pressures easily adjusted to 175 P.S.I. Gives as much pressure on water base chemicals as it will on oil base chemicals. Keeps solutions thoroughly agitated in ANY size container up to and including a 55 gallon steel drum.

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COMES FULLY EQUIPPED READY FOR USE

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FUMIGATION TARPS

We specialize in the manufacture of plastic and coated fabric tarpaulins for fumigation.

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For indoor, outdoor occasional or heavy usage.

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Advise your needs. We will send samples and prices.

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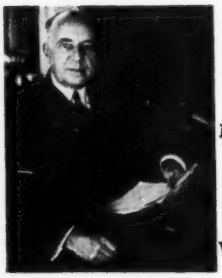

BORER LINES

by **Dr. Thomas E. Snyder**

Consultant on Wood Boring Insects and Wood Preservation

Termite Attack on Plastics and Fabrics

The only plastic that I have tested which has not been attacked by termites is cellulose acetate; this plastic was later used for termite cages. Phenol-formaldehyde resins are much more resistant than urea-formaldehyde resins as glues for plywood. Polyvinyl chloride coatings for underground cables have been attacked by termites. Glazed coal-tar pitch coatings applied to wood pulp conduits are resistant.

Termites have also penetrated neoprene synthetic rubber and pure rubber insulations on underground wires.

Cotton fabrics used out of doors, for military or for farm and household purposes, are subjected to the deteriorating action of both termites and micro-organisms. Although losses from termite attack are not so general as losses from the latter, they can be very great and cause enormous waste of materials.

The effectiveness against attack, both by termites and by micro-organisms, of chemical finishing treatments applied to cotton fabric has been determined. In general, those treatments that protect fabric from attack by termites make it also resistant to micro-organisms. However, some effective mildew-resistant treatments allowed attack by termites.

The following treatments gave excellent protection against attack by both agencies: Copper naphthenate in Varsol (1% copper by weight) plus 15% creosote; copper pentachlorophenate (0.5% metallic copper) in butyl cellosolve; cuprammonium hydroxide; copper oleate; a mixture of copper naphthenate and copper oleate; mercuric chloride with 8-hydroxyquinoline; and copper naphthenate. The following permitted light attack by termites; with the exception of cup-

(Continued on page 56)

Distribution *makes* the Difference in...

RESIDUAL SPRAYING

SPRAYING SYSTEMS
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SPRAY NOZZLES

Distribution of liquid particles are very important in residual spraying. TeeJet Spray Nozzles give you uniform distribution over entire pattern area . . . and proper atomization. Available in any capacity, nozzle assembly includes interchangeable orifice tip and strainer. Write for Bulletin 58.

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A precision, positive shut-off valve. Lock catch holds valve open when desired. Light in weight, comfortable. Supplied with straight or curved extensions. Use with any TeeJet Tip. Write for Data Sheet 4675.

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EXCLUSIVE FRANCHISE

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For Termite & Powder Post Beetle

- **25 Years' Acceptance**
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You Name It... We Have It...

A Complete Line Of Chemicals For The PCO!

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Fly Sprays
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Write For Complete Price Catalog

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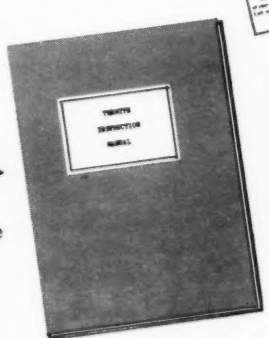
Powerful sales-building folder. Imprinted with your name and address at nominal charge.

TERMITE INSTRUCTION MANUAL ▶

Filled with helpful information on termite treating procedures. Get one for your service men. FREE to customers.



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Inquiry-getting, sales-producing ads that build business for you. NO CHARGE! Write for proof sheet.

If you have any pest control problems, Wood-Treating will be glad to give you the benefit of their years of experience without obligation. Write!

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PEST CONTROL

news

CDC Develops DDVP, Newest Phosphate for Resistant Flies

DDVP, a new organic phosphorous insecticide, has been developed by the Communicable Disease Center's Savannah labs. Said to be more potent in killing insects and less toxic to humans than many modern economic poisons, DDVP reportedly quickly kills flies and other insects resistant to DDT.

Chemically known as dimethyl dichloro vinyl phosphate, the discoverers say this pesticide is safer for animals and man than other organic phosphorus insecticides now in use.

The new poison was developed by Dr. George W. Pearce, chief of the chemistry section of the Savannah laboratory, and chemists Arnold M. Mattson and Miss Jane T. Spillane.

Although not commercially available and not registered in Washington, reliable sources reveal Montrose Chemical Co. of Newark, N. J., is pilot-planting DDVP and is offering limited quantities for experimental use only.

Dipterex For Resistant Roaches

A new tablet formulation of Dipterex that is to be dissolved in water is to be offered by McLaughlin Gormley King Co. of Minneapolis in about 45 days. It is reported the solution made from these tables can be sprayed to control American and Oriental roaches and the resistant German roach.

Dipterex is the phosphate compound previously recommended as suitable in fly baits to which some attractant has been added.

Getz Hires 7 Entomologists

Seven graduate entomologists have been added to the staff of Getz Exterminators, Inc., St. Louis, Mo., company president Herman L. Fellton announces. They are: Alan L. Steffen, Ohio State; Wheyland A. Rothenburg, Auburn; Virgil R. Bayles, Kansas State, Chester W. Robinette, Purdue; Milton T. Bodman, Illinois; John Hayward, Minnesota; and Keith A. Wolfenbarger, Kansas.

Dr. Ernest W. Laake is the new Dallas, Texas city entomologist and biologist. Recently, he completed 41 years of service with the USDA's Bureau of Entomology and Plant Quarantine. At present, Dr. Laake is working on plans for municipal fly and mosquito control programs in Dallas.

Suppliers' Staff Changes

Richard P. Porter has been appointed a vice president of Larvacide Products, Inc., New York City. He will be in charge of sales for soil fumigants and horticultural specialties.

M. J. Siciliano has been transferred to the Chicago district sales office of Carbide and Carbon Chemicals Company. Other company sales department shifts find **J. R. Wheatley** assigned to the eastern seaboard, and **R. R. Kessler** moved to New England and New York state.

Robert T. Miller has joined Du Pont's Grasselli Chemicals Department in Philadelphia as a turf chemicals specialist.

Arthur Raven is new assistant sales manager for the Emulsol Chemical Corp., Chicago, Ill.

Kious Resigns NPCA PR Post

R. E. "Zeke" Kious, public relations director for the National Pest Control Association since October 1953, has resigned that position according to Dr. R. E. Heal, NPCA executive secretary. Mr. Kious, whose future plans are unannounced, will leave his post on or before April first.

Clements Fla. PC Board Sec.

F. Peter Clements, Clements' Services, Fort Lauderdale, Fla., has been named secretary of the Florida Structural Pest Control Board. Clements' address is 1507 S. Andrews Avenue.

Manufacture of 1080 Discontinued by Monsanto

Manufacture of the rodenticide 1080 has been discontinued by Monsanto Chemical Co., St. Louis, Mo.

Explaining their position, Monsanto said production of 1080 since the close of World War II has been on a restricted and carefully controlled basis. Made available as the result of urging on the part of the government and the pest control industry, Monsanto always felt 1080 would have a temporary position as a rodenticide because of its very toxic nature and the hazards accompanying its use.

Since the advent of newer and safer compounds for rodent control, the firm believes there is no longer a vital need for 1080. Monsanto has stockpiled a supply of the chemical and will be able to fill normal requirements of regular customers for the next several months.

Mosquito Assn. Report Ready

Official proceedings of the joint annual meeting of the American Mosquito Control Assn. and the New Jersey Mosquito Assn., held at Atlantic City last spring, are now off the press and ready for distribution, announces Dr. Bailey B. Pepper, secretary of the New Jersey Group.

Copies of the proceedings may be obtained at cost by writing to the Department of Entomology, Rutgers University, New Brunswick, N. J. Sixty papers presented by mosquito control experts from the United States and foreign countries are included in the 310-page book.

Charles Riess, president of the Canadian Pest Control Assn., recently moved his company into this new building in Winnipeg, Manitoba. Structure directly in rear of front office is a fumigation vault.

Bakers' Expo Next Oct.

It's a little far away, but you might put on your calendar dates for the Baking Industry Exposition to be held October 1-6.

If you do work in bakeries, it might be worthwhile to visit this show to see the kind of equipment available to these clients. Advance releases say everything from the order blank to the truck which delivers the baker's goods will be on display. It's to be held in the Convention Hall at Atlantic City, N. J.

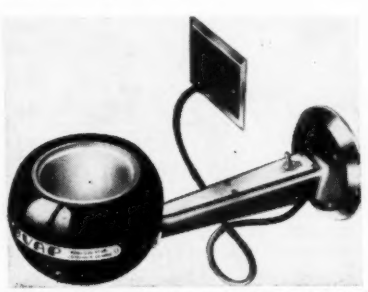
Fruit Fly Control in Hawaii

"Fruit Fly Control With Poisoned-bait Sprays in Hawaii" is the title of a recent publication of the U.S. Department of Agriculture. Formulations and correct applications for effective fruit fly control are thoroughly explained in this four-page brochure. For free copies write the USDA's Agricultural Research Service, Washington 25, D. C., and ask for Bulletin ARS-33-3.

New Aerovap Vaporizer

Greater safety and health is said to be the keynote of a new, improved Aerovap Insect Control System being manufactured by American Aerovap, Inc., New York City.

The new Aerovap D-20 model reportedly incorporates a specially designed thermal circuit-breaker that is sealed at a pre-set maximum temperature to protect against overheating and over-vaporization. According to the manufacturer, the new circuit-breaker provides greater safety by reducing blow-time more than 50% with an accompanying reduction of over 75% in excessive chemical temperature. The complete instrument is said to meet UL and Canadian Standards Association requirements.



Aerovap vaporizer said to be fully protected against overheating and over-vaporization.

Anticoagulant rodent bait station being manufactured by Donco, Inc.

Donco Rodent Bait Station

A liquid rodenticide dispenser, said to be the only one of its kind on the market, is now being manufactured by Donco, Inc., Englewood, Colorado. According to the company, the dispenser is made of strong, durable Styron, is 5¼" high, and has a drinking trough 2¼" wide and ¾" deep. This small evaporation area reportedly assures long term effectiveness without frequent refillings.

Donco is also distributing a water soluble rat and mouse killer, containing pivalyn, which is said to be 10 times more acceptable to rodents than plain tapwater. A 1½ ounce package of the rodenticide mixed with one quart of water is used in the bait dispenser.

Planes Boost PC Says CAA

One acre out of every six under cultivation in the United States is treated by aircraft each year with dust, spray or other chemicals reports the Civil Aeronautics Administration.

Gale F. Hanson, CAA agricultural operations specialist, gave this estimate at a recent agricultural aviation research conference:

"The total dusts and sprays applied by air each year would more than fill 1,000 freight trains, each 50 cars long. Aerial pest control, weed control and fertilizing adds an estimated three billion dollars to farm income each year."

Hanson told the conference if aerial application of insecticides were suddenly stopped it would create a food shortage and panic.

INSECT REPORT

Contains pertinent portions of the **Cooperative Economic Insect Report** issued by the U. S. Department of Agriculture, Agricultural Research Service, during the last 30 days. PCOs noticing infestations in their own areas are urged to report them to **Pest Control** so this information may be added to this monthly report.

BOXELDER BUG
(Leptocoris trivittatus)

Utah: Annoying in several communities. **Maryland:** Concern in homes in Queen Annes and Prince Georges Counties. Also in houses at Barclay and Silver Springs.

BROWN BANDED ROACH
(Supella supellectilium)

North Carolina: Heavily infesting homes at Reidsville.

CLOTHES MOTHS

Utah: Extensive injury to woolens in two large storage rooms at Logan.

CLOVER MITE
(Bryobia praetiosa)

North Carolina: Heavy infestations in Stokes, Person, and Yadkin Counties.

MOSQUITOES

California: Five species found in Santa Clara County recently.

OLD HOUSE BORER
(Hylotrupes bajulus)

Virginia: Damaging seasoned structural wood of homes in Pulaski and Lee Counties.

RICE WEEVIL
(Sitophilus oryza)

South Carolina: Survey of farm bins in Florence area shows less than 5% infestation in corn.

STORED GRAIN INSECTS

Maryland: The following were found infesting a carton of crown bottle caps in Baltimore: red flour beetle, lesser grain borer, and flat grain beetle.

TROPICAL RAT MITE
(Bdellonyssus bacoti)

Florida: Troublesome in a garage apartment in Gainesville.

Charleston Rubber Catalog

A new 28 page bulletin describing the protective equipment manufactured by the Charleston Rubber Company, Charleston, S. C., is now available from firm headquarters. Included in the publication are chemical reference charts, a glove selector guide, and information on the use and care of gloves.

Residex Moves

Residex Corporation, formerly of Newark, has moved to 1500 West Elizabeth Ave., Linden, New Jersey, its manager, Dr. John Lembach has announced. Dr. Thomas Fisher, entomologist, has been added to the technical service staff to work on the company's expanding line of pest control products and equipment.

Purdue Insect, Rodent Films

The film library at Purdue University has 14 insect and rodent movies available to pest control operators on a loan basis. Charge is 75c per film plus postage. For information and reservations contact Professor L. D. Miller, Michael Golden Shops, Purdue University, Lafayette, Indiana. All of the following films are 16 mm.:

Battling the Corn Borer, 10 min., color, sound, Allis Chalmers.
Beware the Japanese Beetle, 13 min., B&W, silent, USDA.
Block That Termite, 20 min., B&W, sound, USDA.
Cicada, 10 min., B&W, sound, USDA.
The Corn Borer, 10 min., color, sound, Iowa State College.
Corn's Hidden Enemies, 10 min., color, sound, Shell Chemical Corp.
Creatures of the Underworld, 22 min., color, silent, Extermital Termite.
Enemies of Man, 18 min., B&W, sound, Wil-Kil Pest Control Co.
European Corn Borer, 10 min., color, sound, USDA.
500,000 to 1, 22 min., color, sound, Sinclair Refining Co.
Four Little Mice and Their Control in An Orchard, 20 min., B&W, sound, USDA.
Kill 'em With Gas (Rats), 17 min., color, sound, Purdue University.
Spittlebug and Its Control, 15 min., color, sound, Hercules Powder Co.
Vandals of the Night (Rats), 20 min., color, sound, U. S. Fish & Wildlife Service.

3 New Orb Products

Orb Industries, Philadelphia, Pa., announces three new additions to its expanding line of pest control chemicals.

The "Orb Three Pounder" is a new, larger package for their disposable aerosol bomb and contains the same 100% Pyrenone formulation as the smaller Orb bomb introduced some time ago. The "Three Pounder" is packed six to a carton.

Orb is now distributor for Tinolan OB Mothproofing Concentrate manufactured by Tinolan Company of American. Said to have been used in this country for some 20 years, Tinolan OB has as its active ingredients parachloraniline oleate and parachloraniline salicylate. The concentrate is diluted with insecticide base oil to make an oil-based mothproofer. Finished formulation is said to meet USDA registration requirements. Data on its toxicity and mothproofing qualities are available.

Third addition is Linspray, a new ready-to-use lindane formulation in oil solution. Orb says this material is especially useful in service work where no odor whatsoever can be tolerated. It is claimed to be completely free from the usual base oil or insecticide odor.

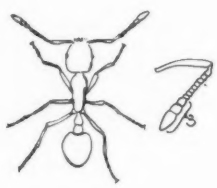
Pest Control PRIMER

LOOK ALIKES: 3

Prepared by DR. MARION E. SMITH and HSIU-FU CHAO
Entomology Department, University of Massachusetts, Amherst

Pharaoh's Ant and Thief Ant

Here is the third in a series of illustrated columns that tell how to correctly identify insects that are often mistaken for other pests. You can make good use of this material both for your own self-improvement and servicemen training programs. This month's LOOK ALIKES are the Pharaoh's ant and thief ant. In February, the authors explained the physical differences between the carpenter ant, pavement ant, and acrobat or shed builder ant.



	PHARAOH'S ANT Monomorium pharaonis	THIEF ANT Solenopsis molesta
Antenna	**Three** segments in the club.	**Two** segments in the club.
Size	Worker 1.5 - 2.5 mm. (1/10 inch); slightly larger than thief ant.	Worker 1 - 2 mm.; slightly smaller than Pharaoh's ant. Smallest house ant.
Color	Yellowish or reddish.	Yellowish brown.
Food	Omnivorous: sweets, grease, meats, dead animals, insects, seeds. Gets into everything.	Animal food chiefly: other ant larvae, dead animals, cheese, meat, grease; oil, seeds, nuts - no sweets.
Habitat	Under foundations and in walls and cellars of houses and heated buildings.	In cracks and crevices of buildings, near kitchen sink; often in nests of larger ants especially under rocks.

New Pressure Maid Sprayer

A new, improved Model 50 Pressure Maid portable sprayer is being produced by the Campbell-Hausfeld Co., Harrison, Ohio. It is said to be equipped with a 1/3 HP motor instead of the ¼ HP formerly employed, which reportedly makes it ideal for spraying mothproofing materials and disinfectants.

Other sprayer features include: cast iron construction, single cylinder and direct drive. According to the manufacturer it delivers about 2 cubic feet per minute at 40 pounds maximum pressure and is equipped with a spray gun and 15 feet of air hose.

Write firm headquarters for details on the Pressure Maid.

TERMITE TOOLS for the PCO

NEW ENGLAND CARBIDE TOOLS

ROTARY DRILL BITS • HAMMER BITS

For FASTER and EASIER DRILLING

in any type of masonry

PCE offers a complete line of these valuable tools for the PCO. The carbide tip makes them the longest lasting, hence the most economical.

CYCLO-TWIST Rotary Drill Bits, for use with electric rotary drill or hand brace in soft or medium masonry materials. Available in diameters from 1/8" to 1½". Extra long lengths available. THUNDER-TWIST Hammer Bits for use in green concrete or hard masonry. Available in diameters from 3/16" to 1", long lengths available.

Write for data sheet and price list of New England Carbide Tools.

STAR HAMRTWIST MASONRY PERCUSSION DRILL POINTS

Star Drills and Spiral Bits for Hand Hammering. Products of Star Expansion Bolt Company. A fast and easy cuttting tool giving a round and uniform hole in concrete, brick, stone and tile. Write for list of sizes.

ROD NOZZLES

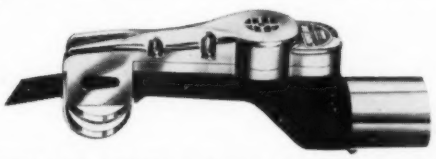
FORGED STEEL TIPPED

For pressure treating Wood, Concrete Blocks and Slabs and Soil Impregnating. A new, long lasting practical tool especially developed for termite operators. Forms leak-proof swedge, with 5/16" drilled hole.

6"	$2.00
12"	2.25
18"	2.50
36"	3.30
Hammer Head	2.95
Hose and shut-off valve attachment	4.50

SUPER SAW PORTABLE POWER SAW

Saves you more actual time, right on the job, than any other tool in your kit.



NO STARTING HOLE NEEDED! Drill may be rotated around the SUPER SAW through a full 260 degrees, giving complete flexibility for applications where a fixed position would prevent access or use.

Pest Control Equipment Co.

24 North Bond Street MO-8-1197

Mount Vernon, N. Y.

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Your Service Kit Should Include

A GETZ Blower

PRICES TO THE TRADE

1 to 35 Blowers	$1.35 each
36 to 71 Blowers	1.25 each
72 to 143 Blowers	1.10 each
144 and over	.95 each

F. O. B. St. Louis

PREPAID IF CASH WITH ORDER

GETZ

Reg. U. S. Patent Office

POWDER BLOWER

GETZ EXTERMINATORS, INC.

2234 Olive Street — St. Louis 3, Mo.

MICE - GLUE

GETS MICE LIKE FLYPAPER GETS FLIES

7½ lbs. $1.00 per lb. 25 lbs. $.90 per lb.

100 lbs. $.80 per lb.

BIRD - REPELLENT

Keep Pigeons, Starlings and Other Birds from Buildings

7½ lbs., $1.00 per lb. 25 lbs., $.90 per lb.

100 lbs., $.80 per lb.

PEST CONTROL CHEMICAL CO.

324 Broadway Write for details Buffalo, N. Y.

Be Ahead 4 Ways With UNI-VAP Insecticide Vaporizer

UNI-VAP IS DESIGNED AND GUARANTEED TO PROVIDE:

- ★ **Effective Insect Control** by vaporization of lindane.
- ★ **Trouble-free operation** with Westinghouse adjustable UNI-THERM Thermostat.
- ★ **Long Life** with Chromalox Heating Element.
- ★ **A LIBERAL PROFIT FOR YOU.**

Each unit is covered by $100,000 product insurance. Join the leaders. Switch to Universal, the most reliable in the vaporizer field.

UNIVERSAL LINDANE in 1 oz. heat sealed, leakproof packets, and in 1 lb. cans.

Write for new lower prices and literature.

Universal ELECTRIC PRODUCTS CORP.

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Madison 4, Wisconsin

notebook

"Man-Eating" Thrips

Add thrips to the growing list of insects PCOs are occasionally called upon to control.

While mainly an agricultural pest, the small, slender insects sometimes invade homes and attack man. Their bites cause a sharp prick followed by a slight itching sensation.

Thrips vary from 1/50 to 1/3 of an inch in length. They are usually either yellow, tan, orange, reddish-brown, or black in color. Mouthparts are fitted for piercing, rasping and sucking.

Being such small insects, they are able to enter dwellings directly through screens.

Best control chemical seems to be a 5% DDT residual spray around doorways, lights, and on screens. If insects come into the house, use a standard pyrethrum space spray or aerosol.

1955 CDC Report

(from page 22)

ried out by personnel who have received some training in rodent control but who make no claim to be experts in the field. However, if the species of rat concerned is not definitely known, the 0.25-mg.-per-gram concentration should be used.

Warfarin may be used for initial rodent control under essentially all conditions, using a minimum baiting period of 2 weeks. In addition, consideration should be given to establishing bait stations for permanent control of rats in places which are subject to reinfestation. Two years of experience have shown that Norway rats can be controlled in nonrat-proof buildings so long as poisoned bait is available, but eradication was not achieved. No difference in the residual effectiveness of the 0.100- and the 0.050-mg.-per-gram bait concentrations was observed. The bait stations were inspected approximately every 6 weeks and fresh poisoned bait was supplied.

• Pival

The more recently introduced compound pival (2-pivalyl-1,3-indandione) appears, in a general way, to be approximately equal to warfarin in its rodenticidal effectiveness. The acceptance of pival baits by roof rats, Norway rats, and mice has been good in both laboratory and simulated field tests. Laboratory tests showed that pival and warfarin were about equally good for mouse control. Tests showed pival slightly better (laboratory) or about the same (simulated field) as warfarin for roof rat control. Both laboratory and simulated field studies indicated that pival in solid bait was somewhat inferior to warfarin for control of the Norway rat, but pival-poisoned water (0.006 per cent acid equivalent) with 5 per cent sugar as an attractant was slightly more effective against this species than a comparable formulation of warfarin (0.005 per cent acid equivalent).

Corn meal, as well as some of the other ground grains, has proved to be a good bait material for use with rodenticides which require repeated acceptance over several days. However, in many areas the meal becomes insect-infested after several days of exposure and must be replaced at frequent intervals with fresh bait in order to assure continued acceptance by rodents. Pival has been found to inhibit the development of a number of insects infesting grain, including flour beetles (*Tribolium* sp.), cigarette beetles (*Lasioderma serricorne* (F.)), saw-toothed grain beetles (*Oryzaephilus surinamensis* (L.)) and flour moths (*Ephestia* sp.). Cockroaches, however, were not affected when fed for 30 days on bait containing 0.25 mg. of pival per gram of bait.

It has been hoped that pival would not only control rodents but would also kill ectoparasites before destroying their hosts. Recent work has indicated that the oriental rat flea (*Xenopsylla cheopis*) and two species of rat mites (*Bdellonyssus bacoti* and *Echinolaelaps echidninus*) were not affected by doses of pival lethal to the host. However, limited work here and elsewhere indicates that lice may be controlled by such dosages.

• ANTU

ANTU still holds a definite place as a quick-acting poison for the Norway rat. Its use to reduce large populations rapidly may be followed by the use of anticoagulant rodenticides to achieve complete and lasting control. ANTU should not be used against the same populations more often than about once a year. It induces a persistent bait shyness in rats, and this property makes ANTU ineffective for repeated use against the same rat population. ANTU is not effective for the control of roof rats or mice. Its safety record is good and it may be used in residences and food-handling establishments.

• Sodium Monofluoroacetate (1080)

Sodium monofluoroacetate (1080) is still the most effective, fast-acting rodenticide, but its extreme toxicity to man and animals requires that it be used only on certain types of premises and only by carefully trained crews. The precautions necessary for the safe use of 1080 are numerous and involved. They are described in "Operational Memoranda on 1080" issued by the Communicable Disease Center.

• Baiting Problems

In tests in Savannah, Georgia, corn meal has proved to be the most readily accepted cheap bait. In general, any available cereal bait may be used. It is worth reemphasis that under certain conditions it is very difficult to get rodents to take any bait; for example, where food is available in great variety and abundance, as in some warehouses. Such conditions constitute baiting problems, a term which implies that the origin of the problem is not in the particular poison used but in the ecology of the rodents themselves. Obviously, in testing any given rodenticide formulation it is necessary to be certain that apparent failure of the formulation is not caused by baiting problems. These problems can be solved effectively only through extensive knowledge of the habits of the rodents. They do not occur more frequently when simple cereal baits such as corn meal are used than when complex bait mixtures are used.

organization news

New officers of the North Carolina Pest Control Assn. elected during this year's PCO Short Course at State College, Raleigh, are l. to r.: **Lacy Webster,** Greensboro, director; **Eugene Mabel,** Charlotte, vice president; **J. W. Taylor,** Wilmington, president; **A. T. Best,** Durham, secretary-treasurer; and **Walter Wilson,** Winston-salem, director and outgoing NCPCA president.

71 Attend Jan. 25-26 N. C. PCO Short Course

Seventy-one PCOs from North Carolina, Oklahoma, Virginia, Georgia, and Tennessee attended the fifth annual Pest Control Operators' School at North Carolina State College, Raleigh, January 25-26.

During the two day meeting delegates heard talks on sales promotion, beetle control, insect resistance, legislation, grain fumigation, fly control, and safety. According to Dr. Clyde F. Smith, conference chairman and head of the N. C. State Department of Entomology, main conference theme was study of the effects of legislation from the standpoint of the State Department of Agriculture, the College, the PCO, and the home owner to raise the industry standards.

Featured conference speakers were Matt Russ, Orkin Exterminating Co. sales manager, Charlotte; R. J. Kowal, chief, Forest Insect Research Division, Southern Forest Experiment Station, Asheville; Dr. Ralph E. Heal, NPCA Executive Secretary, New York; Clyde A. Bower, Oklahoma State Board of Agriculture, Oklahoma City; Arnold Shulman, Orkin Exterminating Co. legal department, Atlanta; Myron Smith, Hill-Smith Termite Control Co., Memphis; and N. C. State College entomologists Walter M. Kulash, George D. Jones, and Frank E. Gutherie.

During the conference members of the North Carolina Pest Control Association elected these officers for 1955: president, J. W. Taylor, Taylor Exterminating Co., Wilmington; vice president, Eugene Mabel, Orkin Exterminating Co., Charlotte; secretary-treasurer, A. T. Best, Best Exterminating Service, Inc., Durham. Main item of business for NCPCA members was the formation of minimum standards for termite control jobs in North Carolina.

Ill. PCO Clinic Apr. 28-29

Illinois Pest Control Assn. will hold its second annual pest control operators' clinic at Robert Allerton Park, Monticello, Ill., on April 28-29. Cooperating in the two day program are the University of Illinois Bureau of Business Management and the Illinois Natural History Survey.

Subjects to be covered at this year's meeting entitled, "The Government and You," include social security laws, workmen's compensation regulations, governmental payroll taxes, health department regulations, Pure Food and Drug requirements, and the Federal Insecticide Rodenticide, and Fungicide Act. Also on the agenda are discussions on and demonstrations of PCO control problems.

Clinic committee consists of R. E. Berns, Aerosol Engineers, Chicago, and president of the IPCA; John Mock, Arwell, Inc., Waukegan; and George Hockenyos, Sentinel Laboratory, Springfield.

The Illinois program is opened to all interested pest control operators. Information regarding the clinic, reservations, and registration may be obtained by writing Norman Johnson, University of Illinois Extension Division, 116 Illini Hall, Champaign.

CALENDAR OF MEETINGS

New York Pest Control Assn. Monthly Meeting, National Republican Club, New York City, Mar. 8.

Missouri Pest Control Assn. Annual Spring Conference, Kingsway Hotel, St. Louis, Mar. 11-12.

Professional Exterminators Assn. Monthly Meeting, Museum of Natural History, New York City, Mar. 14.

Connecticut Pest Control Assn. Monthly Meeting, Aloha Inn, Cromwell, Mar. 15.

Michigan Pest Control Operators Assn. Short Course, Mar. 15-17.

New Jersey Pest Control Assn. Monthly Meeting, Entomology Building, Rutgers University, New Brunswick, Mar. 16.

Northwest Pest Control Assn. Monthly Meeting, The Standard Club, Minneapolis, Minn., Mar. 17.

Washington, D. C. and Virginia State Pest Control Assns. Annual Joint Meeting, Cloud Room, Washington National Airport, Washington, D. C., Mar. 18.

Texas Pest Control Assn. Quarterly Meeting, Austin, Mar. 19.

National Sanitary Supply Assn. Trade Show and Convention, Convention Hall, Atlantic City, N. J., Mar. 20-23.

Master Pest Control Operators Assn. Monthly Meeting, Dayton, Ohio, Mar. 30.

New England Pest Control Assn. Monthly Meeting, University Club, Boston, Mass., Mar. 31.

Illinois Pest Control Assn. Second Annual PCO Clinic, Robert Allerton Park, Monticello, Apr. 28-29.

Indiana Pest Control Operators Assn. Meeting, place to be announced, May 10.

Canadian Pest Control Operators Conference, Ontario Agricultural College, Guelph, Canada, May 25-27.

Okla. PCA Termite Bulletin

An entomological study entitled, "The Development of a Termite Colony," suitable for use as a public relations and sales aid, is available free to TOs from the Oklahoma Pest Control Association. Authored by Dr. G. A. Bieberdorf, entomology professor at Oklahoma A. & M. College, the six

page report covers both termite habits and behavior.

Although copyrighted by the Oklahoma PCA, the group writes it will be glad to grant permission to reproduce the report to individuals or groups who request it. Contact J. Earl Griffin, Oklahoma Pest Control Assn., P. O. Box 176, Tulsa, Okla., for either copies of this report or permission to reprint it.

Form Fla. County Assn.

Jacksonville, Florida, PCOs have formed the Duval County Pest Control Association writes Harvey R. Clark, secretary-treasurer. Meetings will be held on the first and third Tuesdays of each month.

W. J. Horton, City Pest Control, is president; and Elroy Krestensen, G. & L. Construction Co., vice president.

Secretary Clark's address is 2204 Boulevard, Jacksonville.

Wimmer NY PCA President

Sidney Wimmer, Majestic Exterminating Co., Inc., New York City, is new president of the New York Pest Control Assn. Serving with Wimmer are: Walter Quinn, Sameth Exterminating Co., first vice president; Max Blinder, second vice president; Stephen Rohdie, Excelsior Exterminating & Chemical Co., Inc., treasurer; and Thomas Mahon, NPCA office manager, secretary, all of New York City.

Arbeiter Heads NW PCA

Joe Arbeiter, of Hennepin Exterminating Co., Minneapolis, Minn., was elected president of the Northwest Pest Control Association at its January meeting. Other officers are: vice president, Ernest Lund, Northwest Exterminating Co., Minneapolis; and secretary-treasurer, Ernest L. Levy, Radium Brand Pest Control Service, Minneapolis.

Eastern OPCA Picks Ward

Andy Ward, Termite Exterminator Co., Muskogee, has been chosen president of the Eastern Division of the Oklahoma Pest and Termite Control Association.

Tapped to serve with Ward during 1955 are: vice president, J. W. Paxton, J. W. Paxton Exterminator Co., Muskogee; secretary-treasurer, John Everett, Admiral Pest Control Co., Muskogee; and assistant secretary, J. Earl Griffin, Aggie Chemical Co., Tulsa.

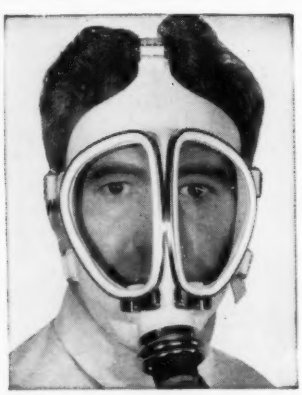
Tronabor Weed Booklet

American Potash & Chemical Corp., Los Angeles, has issued a service bulletin on its borate weed killer, Tronabor, in connection with the product's application under asphaltic paving in airports, highways, parking areas, and playgrounds. A previous release describes Tronabor's uses in oil fields, along railroad rights-of-way, and other applications.

Termite Attack on Plastics

(from page 48)

rammonium fluoride, however, they gave excellent protection against micro-organisms: Cuprammonium fluoride; copper sulfate with 8-hydroxyquinoline, and two different proportions of each of two natural dye extracts: Osage orange and quercitron, with copper sulfate and potassium dichromate.



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PERSONAL BRIEFS

Spring is just around the corner? We see 6" of snow outside our window, but it's nice and warm enough inside for the termites to keep us in business, so let's look at the gossip: **"Tony" Skelly,** manager of Western Exterminator of Atlantic City, N. J. won a 1955 four-door Cadillac completely equipped with hot and cold running chambermaids. Lucky? We guess so! He took only one dollar chance on a raffle put on by the Variety Club of Philadelphia. Skelly was vacationing in Florida when he received the news . . . **Mrs. Ann Graber,** Graber Exterminating Co., Des Moines, Iowa, has decided to carry on the business after her husband's death on December 14th . . . **Kenneth McLeod** succumbed to cancer on December 17th. He ran Pest Control Chemicals in Buffalo, N. Y. and was one of the pioneer PCOs. Business will be carried on by his son Donald and wife Doris. A daughter, Mrs. William Viele, also survives . . . **Edward J. Meier,** serviceman for Oser Exterminating Co. in Denver, passed away January 24th after a long illness . . . **I. B. "Carny" Carncross** of Syracuse, N. Y., and last year's NPCA national convention chairman, is confined to his bed with a liver ailment. Why not drop him a "get well" note at 802 E. Fayette St. in Syracuse? . . . **Fritzie Sameth,** wife of past NPCA prexy **Edwin,** was recently hospitalized and when it became impossible to obtain a nurse from the regular staff, **Helen Buettner,** who has her RN degree, came to the rescue and provided the much-needed care . . . Income Tax Deduction: **Art Gibson,** Sentinel Laboratories, Springfield, Ill., shelled out a $16 taxi fare to get from the Hartford airport to Amherst in order to be on time for the first Eastern PCO conference session . . . Snow stopped the Weisburger insurance firm from being represented at all three conferences, but **Jerry Goodman** did make LSU and **Dave Weisburger** put on his skiis to get to Amherst. He'd planned to include Purdue, but winter's ice and snow nixed that . . . **Herb Packard** and **Karl Hassler,** both from Los Angeles, strolled around Purdue's campus in zero temperatures bare-headed and without topcoats. Either business has been bad (which we doubt), or they're used to cold weather in Southern California . . . PCOs **Harold Berk** from Warren, O. and **Joseph B. White,** from Cleveland, detected much evidence of clothes moth and carpet beetle activity in the residence halls and rooms of the Purdue Memorial Union where PCOs were holding their conference! Of all places! Professor J. J. Davis, let's put the PCO students out to clear that up before next year's meeting . . .

CLASSIFIED ADVERTISEMENTS

When answering ads where box number only is given, please address as follows: Box number, c/o Pest Control, 1900 Euclid Avenue, Cleveland 15, Ohio.

Rates: "Position Wanted" 5c per word, minimum, $1.00. All other classifications, 10c per word, minimum $2.00. All classified ads must be received by Publisher at least three weeks preceding publication date and be accompanied by cash or money order covering full payment.

POSITION AVAILABLE

Industrial insecticide sales manager looking for opportunity to grow with young, aggressive, well-established company. Must be able to set up and take complete charge of industrial field. Should have experience selling accounts and ability to train men. Substantial earnings. This is a lifetime position. Write Box 362, Pest Control magazine.

POSITION WANTED

Graduate entomologist with BS degree and six years experience in field of pest control would like to buy pest control business or become associated with progressive firm. Box 359 Pest Control magazine.

POSITION WANTED

Graduate entomologist with MS degree from Purdue University, pest control specialization, desires work in North Carolina or vicinity. Available in June. Harry B. Moore, 204 Marstellar Street, West Lafayette, Ind.

POSITION WANTED

Experienced exterminator desires position with established pest control firm in metropolitan New York or take over management on a profitable basis. Box 363 Pest Control magazine.

MANAGERS WANTED

World's largest pest control firm, established in 1901, operating in 26 states, needs several high-caliber men for responsible positions. Must have initiative, good judgment, the ability to work and deal with people, and should be personally ambitious. Experience in professions related to pest control helpful. Liberal salary and incentive arrangements provide excellent opportunities with progressive and well established firm. Employee benefits include paid vacations, sick leave, life insurance, hospitalization and pension plan. Training programs for our future managers and other supervisory positions also open to college graduates. All replies confidential. Contact Technical Department, Orkin Exterminating Company, Inc., 713 W. Peachtree Street, N.E., Atlanta, Georgia.

WANTED

Pennsylvania PCO will buy small pest control business located in Middle Atlantic states. Write details to Box 352 Pest Control magazine.

WANTED

Prominent New York City concern will purchase established exterminating business, large or small, in Miami, Florida or New York area. State details. Box 360 Pest Control magazine.

WANTED

Want to buy general pest control business anywhere in New England. Give full details in first letter. Box 361 Pest Control magazine.

WANTED

Reliable New York City Company will purchase exterminating business large or small in New York area. All cash, immediate action. Box 364 Pest Control magazine.

FOR SALE

Lawrence Aero-Mist demonstrator sprayer with dusting attachment. L-40 model with 13 HP Wisconsin. Good as new. Lists at $1600, special $1150. Oregon Fogging and Spraying Equipment Company, 4540 NE 47th Ave., Portland 13, Oregon.

FOR SALE

Mosquito abatement business for sale. Best equipped organization in Midwest. Unique marsh treating machine gives 100% control of mosquito breeding. Effective at great distance. High speed fly control machine. Two Tifas. Unusual insecticide mixer. Equipment cost $17,000. Established seven years. Good reputation, references, accounts. $13,000 cash for quick sale. Owner completing important patents in other fields. Joe Popp, 1416 E. 5th St., Hobart, Indiana, phone 865-M.

Flea, Champion High Jumper

The human flea has been known to leap for a distance of 13 inches and to a height of seven and three-quarter inches. An equivalent leap for a man would carry him 275 feet up into the air and 450 feet horizontally!

pestales

'Short' Circuit

When Des Moines salesman, Jack Kirk, had battery trouble he did what anyone else would do, bought a new battery. But that one soon fizzled-out, too.

After considerable detective work he unraveled the mystery. A small mouse seeking a "safe," snug hiding place had crawled into the generator, died, and cut off the current so the battery wouldn't charge.

What won't they think of in Detroit next?

* * *

Bomb Steer

Report of a bomb in a hotel restroom in Fort Worth, Texas, brought a carload of police racing to the downtown hostelry.

As they cautiously approached the restroom, officers saw the bomb on the floor.

On it was written in big, bold letters, "Insect Repellent Bomb."

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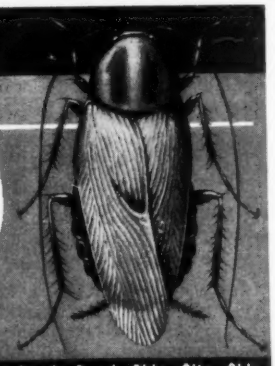

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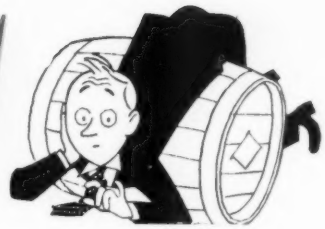

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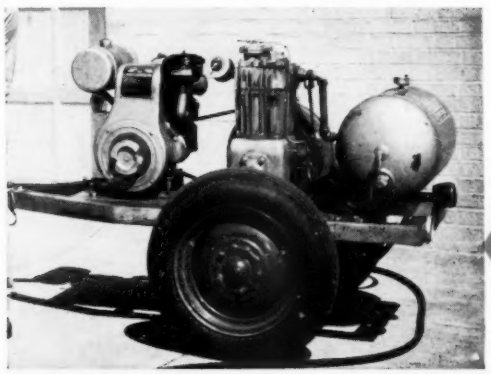

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Complete with 14 lb. self-rotating jack hammer, 2 drills, 100 ft. air hose and all couplings.

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B & G Sprayers are designed exclusively for the day-in, day-out hard use demanded by PCOs. Air-jet agitation insures a constantly concentrated chemical mixture. No chemical ever comes in contact with any moving part. A rugged piece of machinery built to give scores of years of hard service without trouble or breakdowns.

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MODEL 500-S, on skids, motor, 65-gal. Tank including Discharge Equipment **$322.00**

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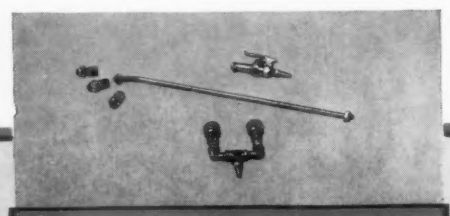
Series B No. 1½ — Complete as pictured. The pump is rated at 2 gallons per minute at zero p. s. i. The motor is 1/3 h. p. Total hose, 112 feet, inside diameter ¼". Pressures up to 150 p. s. i., regulated by hand wheel adjustment. Large-screen suction strainer. Pressure gauge. Quick coupling hose connectors. Shut-off valve, three different capacity nozzles, 18" extension wand, motor-mounted electric toggle switch, 6' neoprene cord with armored plug, renewable hose end adapters, all brass nipples, bushings, cross fittings and elbows.

Prices On Request

Fittings for two-man operation, Series B No. 1½ (as pictured).

Series B No. 2 — For the termite operator who wants larger pump, hose, fittings, etc. Write for detailed specifications and price.



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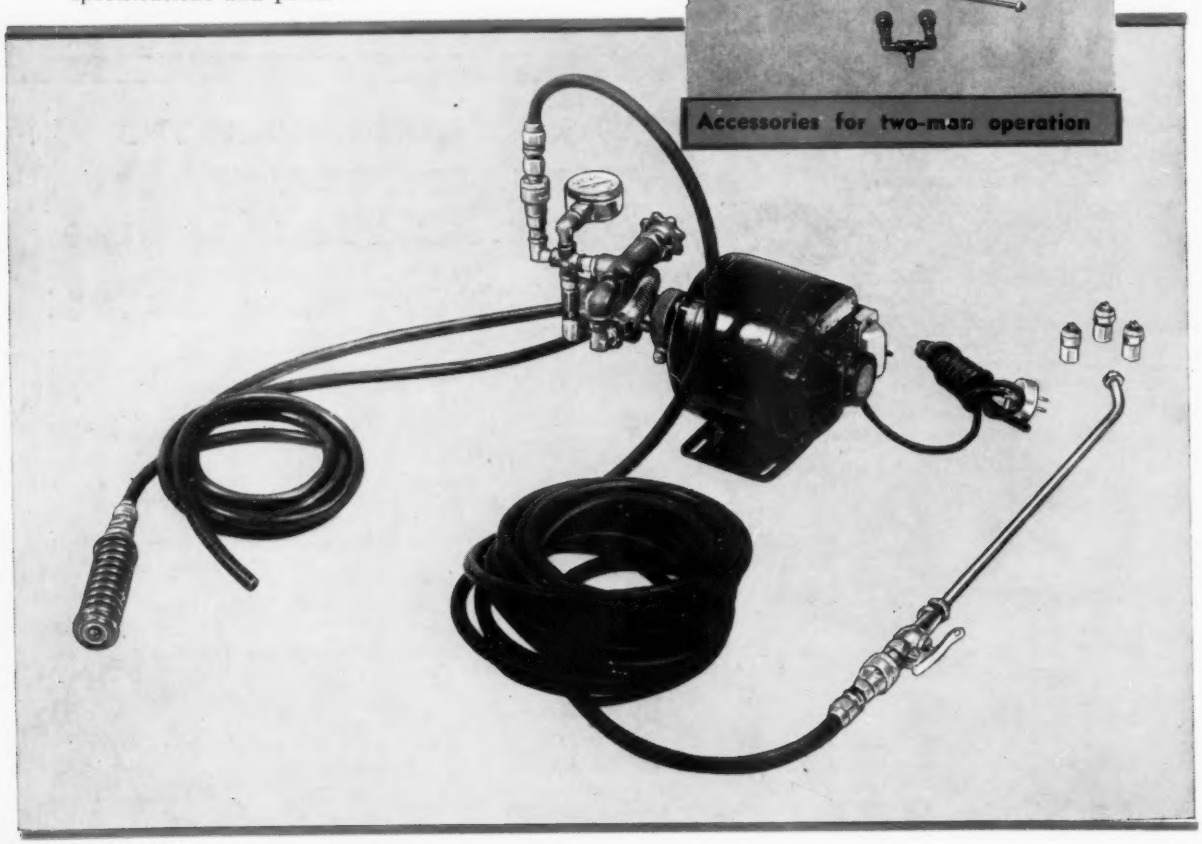

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